CDM

DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

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Libby Asbestos Site

Libby, Montana

Operable Unit 2 – Former Screening Plant and Surrounding Properties

August 2009

Final Feasibility Study Report

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Operable Unit 2 - Former Screening Plant and Surrounding Properties
Libby Asbestos Site
Libby, Montana

August 2009

Contract No. DTRT57-05-D-30109
Task Order No. 00015

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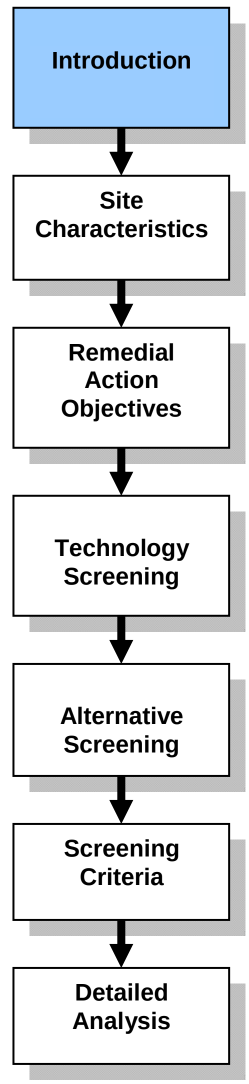
Acronyms

ABS	activity-based sampling
ACM	asbestos containing material
ARARs	applicable or relevant and appropriate requirements
ARI	ARI Technologies Inc.
ARM	Administrative Rules of Montana
BNSF	Burlington Northern and Santa Fe Railroad
BLRA	baseline human health risk assessment
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
DEQ	Montana Department of Environmental Quality
DOE	Department of Engery
EPA	U. S. Environmental Protection Agency
FRTR	Federal Remediation Technologies Roundtable
FS	feasibility study
GCL	geosynthetic clay liner
GRAs	general response actions
Grace	W.R. Grace Company
HQ	hazard quotient
KDC	Kootenai Development Corporation
LA	Libby amphibole
MCA	Montana Code Annotated
MDT	Montana Department of Transportation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ND	non-detect
NESHAP	National Emissions Standards for Hazardous Air Pollutants
O&M	operations and maintenance
OU	Operable Unit
PLM	polarized light microscopy
PP	proposed plan
PPE	personal protective equipment
PRAOs	preliminary remedial action objectives
PRGs	preliminary remediation goals
RI	remedial investigation
RfC	reference concentration
ROD	record of decision
ROW	right-of-way
site	Screening Plant Site
SLERA	screening level ecological risk assessment
TCCT	thermo-chemical conversion technology
TEM	transmission electron microscopy
USC	United States Code
USGS	United States Geological Survey
XRD	X-ray diffraction

%	percent
°F	degrees Fahrenheit
bgs	below ground surface
cfs	cubic feet per second
cy	cubic yards
ft	feet
ft^2	square feet
gpd/ft	gallons per day per foot
L	liters
L/min	liters per minute
S/cc	structures per cubic centimeter
S/cm^2	structures per square centimeter

Section 1
Introduction
1.1 Purpose and Organization

This document is the feasibility study (FS) report for the former Screening Plant Site (site), Operable Unit 2 (OU2) of the Libby Asbestos Site. The FS is the mechanism for the identification, development, screening, and detailed evaluation of remedial alternatives that are capable of addressing risks to human health and the environment from soil contaminated with Libby amphibole (LA) asbestos. The remedial investigation (RI) report for the site (CDM 2009) details the information that was used during the FS process to characterize site conditions, determine the nature of the waste, and assess risk to human health and the environment.



The RI and FS are generally conducted concurrently - data collected in the RI influence the development of remedial alternatives in the FS, which in turn affect the data needs and scope of treatability studies and additional field investigations.

The general FS process follows the steps summarized in the following bullets:

- *Identifying preliminary remedial action objectives (PRAOs)* (Section 3) - Based on the risks that exists onsite and anticipated future residential and/or commercial use of the site, the following PRAOs were developed for contaminated soil at the site:
  - Mitigate the potential for inhalation exposures to asbestos fibers that would result in risks that exceed the target cancer risk range specified by EPA of 1E-06 to 1E-04
  - Control erosion of contaminated soil by wind and water from source locations to prevent the spread of contamination to unimpacted locations and media
  - Implement controls to prevent uses of the site that could pose unacceptable risks to human health or the environment or compromise the remedy
- *Identifying potential general response actions (GRAs) that will satisfy these PRAOs* (Section 4) - GRAs considered for remediation of LA contaminated soil at the site include the following:
  - No action (as required by Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA])

- Monitoring
- Institutional controls
- Engineered controls
- Containment
- Removal, transport, and disposal
- Treatment

■ *Screening the alternatives based on their effectiveness, implementability, and cost* (Section 5) - Once potential alternatives have been developed it may be necessary to screen out certain options to reduce the number of alternatives that will be analyzed. The screening process involves evaluating alternatives with respect to their effectiveness, implementability, and cost. It is usually done on a general basis and with limited resources, because the information necessary to fully evaluate the alternatives may not be complete at this point in the process. Six remedial alternatives were assembled by combining the retained remedial technologies and process options. Details regarding the screening process of the original six remedial alternatives are provided in Section 5. Four remedial alternatives were retained for detailed analysis:

Alternative 1: No Action

Alternative 2: Institutional and Engineered Controls with Monitoring

Alternative 3a: In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

Alternative 3b: In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

■ *Detailed analysis* - Once sufficient data are available, alternatives are evaluated in detail (Section 7) with respect to seven of the nine evaluation criteria. The seven criteria include:

- Overall protection of human health and the environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Short-term effectiveness

- Implementability
- Cost

The two other criteria that are evaluated later in the RI/FS process are:

- State acceptance
- Community acceptance

The alternatives are analyzed individually against each criterion and then compared against one another to determine their respective strengths and weaknesses and to identify the key trade-offs that must be balanced for the site. The results of the detailed analysis are summarized so that an appropriate remedy consistent with CERCLA can be selected. Evaluation of state and community acceptance (the last two of the nine National Oil and Hazardous Substances Pollution Contingency Plan [NCP] criteria) will be conducted after comments are received on the Proposed Plan (PP) and are not evaluated at this stage of the FS process.

After the FS is finalized, a preferred alternative for the site is presented to the public in the PP. The PP briefly summarizes the alternatives studied in the detailed analysis phase of the FS, and highlights the key factors that led to identifying the Preferred Alternative. The PP allows the State of Montana through the Montana Department of Environmental Quality (DEQ) and the community to provide comment on the preferred alternative.

The final phase of the RI/FS process is to prepare a Record of Decision (ROD). Following the receipt of public comments and any final comments from DEQ, the U.S. Environmental Protection Agency (EPA) selects and documents the remedy selection decision for the site in a ROD.

This FS report provides the details of the FS process specific to OU2 and was conducted in accordance with guidance developed by EPA for conducting an FS under the CERCLA (EPA 1988). In addition, the cost estimates for each alternative were developed in accordance with *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000a).

This report is organized as follows:

- Section 1 discusses the purpose of the FS report, the report organization, and site background information (site location, site description, operational history, previous investigations, and environmental setting).

- Section 2 describes the characteristics of the site, including the conceptual site model (CSM), site features and physical characteristics, a summary of the nature and extent of contamination resulting from past activities at the site, and a summary of human health risks posed by site contamination.

- Section 3 describes the process for identifying PRAOs. This section also discusses current and anticipated future land use at the site and identifies potential ARARs for the site.
- Section 4 describes the options for GRAs and the screening and evaluation of different remedial technologies and process options.
- Section 5 describes the remedial alternatives and the screening process followed to reduce the remedial alternatives to those considered to be most suitable for possible implementation.
- Section 6 describes the criteria used to evaluate the alternatives retained during the screening process completed in Section 5.
- Section 7 presents a detailed analysis of the remedial alternatives and summarizes the comparative analysis conducted to compare and contrast the remedial alternatives.
- Section 8 presents a summary of this FS report.
- Section 9 lists the references and documents referred to in this FS.
- Appendix A provides the Summary of Federal and State ARARs Compliance.
- Appendix B provides quantity calculations for the alternatives.
- Appendix C documents the screening of alternatives.
- Appendix D documents the alternative screening cost information. Screening costs are expected to be +100%/-50% of actual costs.
- Appendix E provides the inspection and monitoring schedule.
- Appendix F provides the detailed analysis of alternatives.
- Appendix G provides the detailed alternative analysis cost information. Detailed analysis costs are expected to be +50%/-30% of actual costs.

1.2 Site Location and Description

This FS report was prepared for OU2 of the Libby Asbestos Site (known as the former Screening Plant Site). To facilitate a multi-phase approach to remediation of the Libby Asbestos Site, seven separate OUs were established. These OUs are shown on Figure 1-1 and are described below:

- OU1. The former Export Plant is defined geographically by the property boundary of the parcel of land that included the former Export Plant and is situated on the south side of the Kootenai River, just north of the downtown area of the City of Libby, Montana The property is bounded by the Kootenai River on the north, Montana Highway 37 (forthwith referred to as Highway 37) on the east, the BNSF railroad thoroughfare on the south, and State of Montana property on the west.

- OU2. OU2 includes areas impacted by contamination release from the former Screening Plant. These areas include the former Screening Plant (Subarea 1), the Flyway property (Subarea 2), a privately-owned property (Subarea 3), and the Rainy Creek Road Frontage and Highway 37 right-of-way (ROW) adjacent to Rainy Creek Road (Subarea 4). These subareas are shown on Figure 1-2. This is the OU evaluated within this FS Report.

- OU3. The mine OU includes the former vermiculite mine and the geographic area (including ponds) surrounding the former vermiculite mine that has been impacted by releases from the mine, including Rainy Creek and the Kootenai River. Rainy Creek Road is also included in OU3. The geographic area of OU3 is based primarily upon the extent of contamination associated with releases from the former vermiculite mine.

- OU4. OU4 is defined as residential, commercial, industrial (not associated with former W.R. Grace Company [Grace] operations), and public properties, including schools and parks in and around the City of Libby, or those that have received material from the mine not associated with Grace operations.

- OU5. OU5 is defined geographically by the parcel of land that included the former Stimson Lumber Company. OU5 is bounded by the high bank of Libby Creek to the east, the Kootenai River to the north, and residential/commercial/industrial property within OU4 to the south and west. This OU is approximately 400 acres in size and is currently occupied by various vacant buildings as well as multiple operating businesses (lumber processing, log storage, excavation contractor, etc.). Within the boundary of OU5 exists the Libby Groundwater Superfund Site, which is not associated with the Libby Asbestos Superfund Site.

- OU6. Owned and operated by the Burlington Northern and Santa Fe Railroad (BNSF), OU6 is defined geographically by the BNSF property boundaries from the eastern boundary of OU4 to the western boundary of OU7 and extent of contamination associated with the rail yard.

- OU7. The Troy OU includes all residential, commercial, and public properties in and around the town of Troy, Montana, approximately 20 miles west of downtown Libby.

The vermiculite deposit near Libby is contaminated with a distinct form of naturally-occurring amphibole asbestos that is comprised of a range of mineral types and morphologies. In various past reports, this form of amphibole asbestos has been termed interchangeably by EPA as Libby Amphibole or Libby Asbestos. For the purpose of this report, it will be referred to as Libby Amphibole (LA) asbestos.

The site was historically owned and used by Grace for stockpiling, staging, and distributing vermiculite and vermiculite concentrate to vermiculite processing areas and insulation distributors outside of Libby. Because vermiculite mined from Libby has been found to be contaminated with LA, a known human health risk, EPA initiated an emergency response action in November 1999 to address questions and concerns raised by citizens of Libby regarding possible ongoing exposures to asbestos fibers as a result of historical mining, processing, and exportation of asbestos-containing vermiculite.

The OU2 site is located approximately 5 miles northeast of Libby on the east side of the Kootenai River and at the confluence of Rainy Creek and the Kootenai River. The site is divided into four distinct subareas; the former Screening Plant (Subarea 1), Flyway (Subarea 2), private property (Subarea 3), and Rainy Creek Road Frontage (Subarea 4). Each of the subareas of OU2 is described below in Section 1.3 and is depicted in Figure 1-2.

1.3 Site Background and History

Numerous hard rock mines have operated in the Libby area since the 1880s, but the dominant impact to human health and the environment in Libby has been from vermiculite mining and processing. Prospectors first located vermiculite deposits in the early 1900s on Rainy Creek northeast of Libby. Edward Alley, a local rancher, was also a prospector and explored the old gold mining tunnels and digs in the area. Reportedly, while exploring tunnels in the area, he stuck his miner's candle into the wall to chip away some ore samples. When he retrieved his candle, he noticed that the vermiculite around the candle had expanded, or "popped," and turned golden in color.

In 1919, Alley bought the Rainy Creek claims and started the vermiculite mining operation called the "Zonolite Company." While others thought the material was useless, he experimented with it and discovered it had good insulating qualities. Over time, vermiculite became a product used in insulation, feed additives, fertilizer/soil amendments, construction materials, absorbents, and packing materials. Many people used vermiculite products for insulation in their houses in Libby and soil additives in their gardens. In 1963, the Grace bought the mine and associated processing facilities and operated them until 1990.

Operations at the mine included blast and drag-line mining and milling of the ore. Dry milling was done through 1985, and wet milling was done from 1985 until closure in 1990. After milling, concentrated ore was transported down Rainy Creek Road by truck to a screening facility (known today as the former Screening Plant) adjacent to Highway 37, at the confluence of Rainy Creek and the Kootenai River. Here the ore was size-sorted and transported by rail or truck to processing facilities in Libby and nationwide. At the processing plants, the ore was expanded or "exfoliated" by rapid heating, then exported to market via truck or rail. Historic maps show the location of the "Zonolite Company" processing operation at the edge of the lumber mill, near present day Libby City Hall. This older processing plant was taken off line and demolished sometime in the early 1950s. The other processing plant (known today as the former Export Plant), was located near downtown Libby near the Kootenai River and Highway 37. Expansion operations at the site ceased sometime prior to 1981, although existing site buildings were still used to bag and export milled ore until 1990.

After operations ceased, Grace completed reclamation of the vermiculite mine. Reclamation included demolition of existing facilities and standard land recontouring and revegetation. The former Screening Plant was sold and converted into a nursery and was used for that purpose until 2000.

Over the course of Grace's operation in Libby, invoices indicate shipment of nearly 10 billion pounds of vermiculite from Libby to processing centers and other locations. Most of this was shipped and used within the United States. Nearly all of this material ended up in a variety of commercial products that were marketed and sold to millions of consumers.

The following subsections describe the historic, current, and anticipated future use of each subarea of OU2.

1.3.1 Former Screening Plant (Subarea 1)

The former Screening Plant is located approximately 5 miles northeast of Libby on the east side of the Kootenai River (Figure 1-2). The area is approximately 21 acres in size, and is bordered by Highway 37 to the northeast, the privately owned property to the southeast, Flyway property to the south, and the Kootenai River to the west.

The Screening Plant was utilized from 1975 to 1990 by Grace to screen mined vermiculite by size and grade. The vermiculite was transported from the mine to the site by truck, sorted, and bulk stored in two sheds at the facility. The vermiculite was then loaded onto a conveyor system and transported across the Kootenai River to a conveyor unloading station. Once the vermiculite was transported across the river, it was either trucked to the local export plant (OU1) for processing and shipping or loaded onto rail cars for transportation and distribution to expansion plants outside of Libby.

From 1993 to 1999, the former Screening Plant was used as a fully-operational retail nursery (Raintree Nursery) business where plants, flowers, and trees were grown, stored, and sold. Related plant-care items were also stored and sold at the nursery. The owners of the property lived on the site in a one-story structure that served both as an office and a residence. The largest structure on the property was referred to as the long shed. Approximately one-third of the long shed was used to store nursery supplies, tools, and equipment for the nursery business; the remaining two-thirds were leased to outside parties for storing recreational vehicles, trailers, boats, automobiles, and other items. Five greenhouses were used for growing plants, flowers, and shrubs, and a number of smaller buildings and support structures were used in the nursery operation. Two reinforced concrete tunnels were used to grow mushrooms that were shipped to the Far East for use as medical treatments. A number of steel tanks, hoppers, silos, and other remnants of the former mining operations at the former Screening Plant were stored at the site.

Due to the LA asbestos contamination associated with vermiculite from the Libby mine, the former Screening Plant has undergone extensive investigation and removal actions since EPA began emergency response activities in Libby in 1999.

The property is currently privately owned and is being used for residential purposes. It is anticipated that the property will continue to be used for residential and/or commercial purposes.

1.3.2 Flyway (Subarea 2)

Currently owned by Kootenai Development Corporation (KDC) (a subsidiary of Grace), the area commonly referred to as the "Flyway" is comprised of approximately 19 acres located northeast of Libby, immediately south of the former Screening Plant and the privately-owned parcel (Figure 1-2). The Flyway is bounded by Highway 37 to the northeast, a residential subdivision (River Runs Through It) to the south, the Kootenai River to the southwest, and the former Screening Plant and private property (Subarea 3) to the north. The Flyway is accessed through a gated entrance to the adjacent private property (Subarea 3) off Highway 37. For the purpose of this report, the Flyway area includes the Highway 37 ROW, which is adjacent to the west side of Highway 37. The ROW is used and maintained by the Montana Department of Transportation.

Formerly owned by Grace, the Flyway housed a pump that was used during vermiculite mining operations to convey water from the Kootenai River to the mine site. The pump house, located close to the Kootenai River, has since been abandoned and the pump is no longer functional. The interior insulation of this metal structure was removed and all parts of the building were washed. The empty structure was left on-site for possible future use.

In 1999, when EPA first visited the property, the Flyway was found to contain several vermiculite piles. One portion of the property had been covered with imported fill and it was suspected that vermiculite-containing material had been moved from the former Screening Plant and used as fill to level parts of the Flyway where drainages existed. Following investigation work performed by EPA as part of the Libby emergency response, a portion of the Flyway was remediated in 2001 by Grace at the direction of EPA. In 2003 remediation at the site was performed by EPA, in 2004 additional remediation was performed by Grace at the direction of EPA, and in 2005, EPA performed remediation within the Highway 37 ROW. Details of investigation and remediation activities conducted at the Flyway are provided in Section 2 of the RI report (CDM 2009).

The Flyway is currently vacant, undeveloped land. At this time, there are no plans to develop this property by the owners.

1.3.3 Private Property (Subarea 3)

The private property of subarea 3 consists of an approximate 1-acre parcel situated between the former Screening Plant and the Flyway, and bordered by Highway 37 to the northeast (Figure 1-2). For the purpose of this report, this private property includes the Highway 37 ROW adjacent to the west side of Highway 37. A continuation of the Flyway ROW, this ROW is used and maintained by the Montana Department of Transportation.

Under Grace ownership, the property was likely used for vermiculite mining-related activities, such as the storage or staging of equipment and materials. In recent history, portions of the property were used for equipment decontamination during remediation work at the former Screening Plant and the Flyway (the property was vacant and not in use at the time of cleanup activities). The property underwent EPA investigation and remediation as discussed in Section 2 of the RI report (CDM 2009).

The private property is currently vacant, undeveloped land. There are currently no plans to develop the property by the owners.

1.3.4 Rainy Creek Road Frontage (Subarea 4)

The Rainy Creek Road Frontage, currently privately owned, lie immediately north and south of Rainy Creek Road on the east (i.e., mine) side of Highway 37. This subarea also includes the east ROW of Highway 37 near Rainy Creek Road (Figure 1-2). Approximately 45,000 square feet (ft^2) of land comprises the north frontage; approximately 39,000 ft^2 comprises the south. For a short period, numerous trees were stored at the south frontage for use during restoration at the former Screening Plant. The Rainy Creek Road Frontages were remediated by EPA in 2005.

The Rainy Creek Road Frontages are currently vacant, undeveloped land. It is anticipated that the property will remain as such.

1.4 Summary of Study Area Investigations

The following site investigations were performed from 1999 through 2008 to determine the nature and extent of LA contaminated media. Sampling activities included soil sampling, dust sampling, air sampling, bulk materials sampling, and activity-based sampling (ABS) at OU2. As described in Sections 1.2 and 1.3, this OU has been divided into four subareas: Former Screening Plant (Subarea 1), Flyway (Subarea 2), Private Property (Subarea 3), and Rainy Creek Road Frontage (Subarea 4). The exhibit summarizes previous site investigations as documented in the RI report. For additional information pertaining to the following site investigations, refer to Section 2 of the RI report (CDM 2009).

Exhibit 1-1. Summary of Previous Site Investigations by Area and Year

Year	Type of Investigation	Summary of Site Investigations
Former Screening Plant (Subarea 1)		
1999, December	Soil sampling	Baseline evaluation of LA soil contamination on-site.
2000, March/August	Soil, dust, and scenario-based personal air sampling	Soil sample event to supplement the 1999 investigation and better characterize site soils. Dust samples were collected from various items stored within the long shed to determine if contaminated dust was present. EPA also conducted scenario-based sampling to determine concentrations of LA as a result of maintenance activities.
2001, April - May	Soil sampling	Soil sample event to supplement the 1999 investigation and better characterize site soils.
2003, March	Soil and bulk material sampling	Investigation soil and bulk material sampling activities to determine if soil contained within the root mass of trees of trees removed from the site was contaminated with LA.
Flyway (Subarea 2)		
2000, March	Soil sampling	Baseline evaluation of LA soil contamination on-site.
2000, September	Soil sampling	EPA excavated and collected samples from test pits to document possible exposure to field crews conducting an archaeological investigation.
2001, March	Soil sampling	Exploratory trenching was completed to determine vertical extent of LA contamination within soil not previously investigated.
2001, May/July	Soil sampling	Soil sample event to supplement the 2000 investigation and better characterize site soils.
2003, July	Soil sampling	Soil sample event to supplement the 2000 investigation and better characterize site soils specifically along the eastern boundary of the Flyway. Sampling activities included portions of the Highway 37 ROW.
2005, June	Soil sampling	Soil sampling activities to determine the extent of soil requiring removal along the Highway 37 ROW.
2007, August – 2008, June	Ambient air sampling	Outdoor ambient air samples collected.
Private Property (Subarea 3)		
2000, April	Soil sampling	Soil samples collected from vermiculite stockpiles and soil areas.
Rainy Creek Road Frontage (Subarea 4)		
2003, May	Soil sampling	Baseline evaluation of LA soil contamination on-site.
2003, November	Soil sampling	Confirmation soil samples collected to determine if decontamination run-off water was re-contaminating portions of Rainy Creek Road Frontage.

1.5 Summary of Previous Remedial Actions

Interim remedial actions, such as the removal of vermiculite contaminated dust, soil, and debris, were performed at the site in conjunction with site investigation activities and emergency response actions. These interim actions were taken to reduce volumes of LA and to reduce further exposure to source material. From 2000 until 2006, several removal activities were completed within the OU2 and are summarized below. Exhibit 1-2 was generated from site background and historic information from the RI report. For additional information pertaining to the following remedial actions, refer to Section 2 of the RI report (CDM 2009).

Exhibit 1-2. Summary of Previous Remedial Actions

Year	Material Removed	Summary of Remedial Actions
Former Screening Plant (Subarea 1)		
2000, August - October	Building demolition materials, vermiculite contaminated soil, and debris	Demolition of all buildings except the long shed. Removal of miscellaneous metal debris, vegetative covering, and excavation of contaminated soil. All debris and soil was stockpiled at the site for future disposal at the Former Libby Vermiculite Mine site.
2001, August - November	Building demolition materials, vermiculite contaminated soil, and debris	Demolition of the long shed. Continued excavation and disposal of contaminated soil at the Former Libby Vermiculite Mine site.
2002, August - October	Vermiculite contaminated soil, debris, trees, and vegetative material	Removal of decontamination pad and surrounding soil. Excavation along the banks of Rainy Creek, including removal of trees and vegetation and disposal of contaminated soil at the Former Libby Vermiculite Mine site.
2002, October / 2003, April	Vermiculite contaminated soil, granular pad	Removal of vermiculite contaminated soil and granular pad during installation of potable water well.
2003, September – 2004, August	Vermiculite contaminated soil	Excavation within the Highway 37 ROW and disposal of contaminated soil at the Former Libby Vermiculite Mine site.
2005, July / 2006, May	Vermiculite contaminated soil	Removal of vermiculite contaminated soil and granular pad during installation of potable water well.
Flyway (Subarea 2)		
2001, September	Vermiculite contaminated soil	Excavation and disposal of vermiculite contaminated soil at the Former Libby Vermiculite Mine site.
2004, July - November	Vermiculite contaminated soil	Continued excavation and disposal of vermiculite contaminated soil at the Former Libby Vermiculite Mine site.
2005, June	Vermiculite contaminated soil	Excavation within the Highway 37 ROW adjacent to the Flyway and disposal of contaminated soil at the Former Libby Vermiculite Mine site.
Private Property (Subarea 3)		
2005, June	Vermiculite contaminated soil	Excavation in conjunction with removal activities along Highway 37 ROW and disposal of vermiculite contaminated soil at the Former Libby Vermiculite Mine site.

Exhibit 1-2. Summary of Previous Remedial Actions (continued)

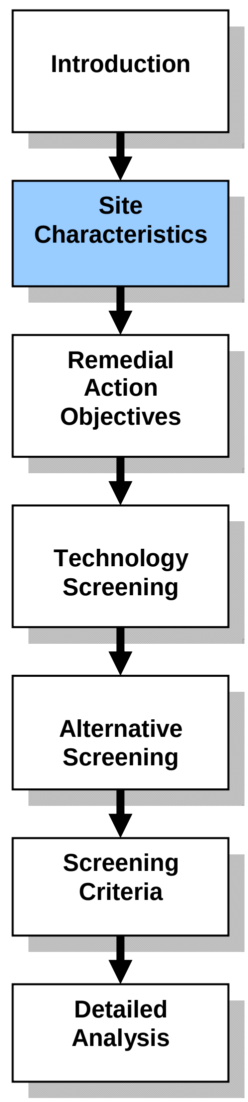
Year	Material Removed	Summary of Remedial Actions
Rainy Creek Road Frontage (Subarea 4)		
2004, August - October	Vermiculite contaminated soil	Excavation along the North and South frontages and disposal of vermiculite contaminated soil at the Former Libby Vermiculite Mine site.
2006, August	Vermiculite contaminated soil, repairs to damaged water line	Excavation to locate and repair a damaged water line and disposal of vermiculite contaminated soil at the Former Libby Vermiculite Mine site.

Section 2
Site Characteristics

This section summarizes topics discussed in the RI (conceptual site model, site features, physical characteristics, and nature and extent of contamination). This section also provides information on the importance of remediating or managing LA at the site.

The final RI and the baseline human health risk assessment (BLRA) reports have identified that most surface soil in OU2 have been remediated, and in these areas there are no complete exposure pathways of concern at present. However, current surface soil is known to be contaminated in the Flyway (Subarea 2). This surface soil contamination includes an isolated portion of the Highway 37 ROW and the area surrounding sample 1-03000 (refer to the final RI report [CDM 2009], Figure 2-1). In addition, residual vermiculite and LA are known to remain in subsurface soil in many locations.

A screening level ecological risk assessment (SLERA) was not performed for OU2. A comprehensive assessment of ecological risks will be completed as part of OU3 (the mine site) of the Libby Asbestos Superfund Site.



For complete details of the site characteristics and the nature and extent of contamination, please refer to the RI report (CDM 2009).

2.1 Conceptual Site Model

The CSM is a basic description of how contaminants enter the environment, how they are transported, and where routes of exposure to organisms and humans occur. In addition, it provides a framework for assessing risks from contaminants, developing remedial strategies, determining source control requirements, and methods to address unacceptable risks.

As mentioned previously, LA is the dominant environmental concern at the site. The CSM for current and future receptors at OU2 is presented in Figure 2-1.

2.1.1 Sources of Vermiculite

Vermiculite and/or vermiculite concentrate was transported to OU2 from the mine to be screened by size and grade. The vermiculite was transported from the mine to the site by truck, sorted, and bulk stored in two sheds at the facility. The potential contaminated media of concern for OU2 include: outdoor air near highways, indoor air, dust in air of vehicles, outdoor air near disturbed soil, general (ambient) outdoor air, and dust in air from disturbance of outdoor surfaces.

2.1.2 Migration Routes and Exposure Pathways

Current potential human receptors include those workers who perform intrusive work beyond the depth of the protective cover and recreational users include persons who fish along the banks of the Kootenai River along the stretch of river that forms the western boundary of the site. Potential future residents include those persons who may residence within the boundary of the site.

The exposure route of chief concern for asbestos is by inhalation of asbestos fibers in air. People at the site may be exposed to asbestos in air by three main pathways:

- Inhalation of fibers released during active soil disturbance activities
- Inhalation of fibers in indoor air
- Inhalation of fibers in outdoor (ambient) air

In locations where the surface soils have been remediated but residual contamination remains in subsurface soils, a number of potentially significant exposure pathways might become complete if future excavation or construction activities were to occur. These pathways include; (a) exposure of tradespersons (excavation workers) during and after the subsurface soil excavation work, and (b) exposure of on-site residents, workers or visitors to releases from post-construction surface soil contamination.

Inhalation exposure resulting from active soil disturbance is believed to be the most significant of these pathways. Section 2.6 provides a summary of human exposure and risk estimates that were derived to date.

2.2 General Site Features

2.2.1 Surface Features

OU2 is mostly undeveloped and contains only two buildings: a privately-owned garage and shed constructed in 2004, and an abandoned pump house on the Flyway property. All equipment has been removed from the pump house and power has been disconnected. The privately owned garage/shed is accessed periodically by the owners to assess property and equipment stored in the building. This building was also constructed with an apartment, which is not currently in use.

The entire OU2 property is fenced to prevent access from Highway 37 and the River Runs Through It subdivision located immediately south of the OU. The western portion of OU2, along the Kootenai River, is not fenced and portions of the Flyway property have shore line that could be accessible via boat. Riprap was placed along the banks of the Kootenai River within the former Screening Plant subarea to protect the property from flooding and bank erosion. This riprap has also reduced the ease of access to this portion of the OU from the Kootenai River.

2.3 Summary of Physical Characteristics

2.3.1 Meteorology

Libby has a relatively moist climate, with annual precipitation in the valley averaging slightly over 20 inches (this includes approximately 60 inches of snowfall). Surrounding higher elevations receive significantly more precipitation. During the winter months, moist Pacific air masses generally dominate, serving to moderate temperatures and bring abundant humidity, rain, and snow. Colder, continental air masses occasionally drop temperatures significantly, but generally only for shorter periods. The average temperatures in December and January are 25 to 30 degrees Fahrenheit (°F).

During summer, the climate is warmer and dryer, with only occasional rain showers and significantly lower humidity and soil moistures. High temperatures of greater than 90 °F are common. The average temperature in July is approximately 65 to 70 °F. Spring and fall are transition periods.

Due to its valley location along the Kootenai River and downstream of the Libby dam, fog is common in the Libby valley. This effect is most pronounced during winter and in the mornings. Inversions, which trap stagnant air in the valley, are also common. Winds in the Libby valley are generally light, averaging approximately 6 to 7 miles per hour. Prevailing winds are from the WNW, but daily wind direction is significantly affected by temperature differences brought about by the large amount of vertical relief surrounding the area.

2.3.2 Geology

The mountains surrounding Libby are generally composed of folded, faulted, and metamorphosed blocks of Precambrian sedimentary rocks and minor basaltic intrusions. Primary rock types are meta-sedimentary argillites, quartzites, and marbles (Ferreira et al. 1992).

Excluding vermiculite-related materials that may be present, *X-ray diffraction* (XRD) analyses by the United States Geologic Survey (USGS) of shallow, sub-surface soil from more than ten sites in the Libby area show that it is comprised of major (greater than 20 %) quartz, minor (5-20 %) muscovite (and/or illite) and albitic feldspar, trace (<5%) orthoclase, clinoclore, non-fibrous amphibole (likely magnesiohornblende), calcite, amorphous material (probably organic) and possible pyrite and hematite. Other minerals will be present at levels below 0.5% and are generally not detectable by routine XRD analysis. These mineral components represent the average components for the area and will vary to some extent depending on location and history. Surface soil contains the above components with the addition of more organic material (USGS 2002).

The vermiculite deposit located at Vermiculite Mountain, the source of LA, is located approximately 7 miles northwest of the town of Libby in the Rainy Creek drainage. The vermiculite deposit specific to the Libby Mine is classified as a deposit within a large ultramafic intrusion, such as pyroxenite plutons, which is zoned and cut by syenite or alkalic granite and by carbonatitic rock and pegmatite. The formation of vermiculite and asbestiform amphiboles in the Libby mine deposit, have been assessed to be the result of the alteration of augite by high-temperature silica-rich solutions (USGS 2002). The Vermiculite Mountain deposit is contained within the Rainy Creek alkaline-ultramafic complex. The Rainy Creek complex is described as the upper portion of a hydrothermally altered alkalic igneous complex composed primarily of magnetite pyroxenite, biotite, pyroxenite, and biotititie. The original ultramafic body is an intrusion into the Precambrian Belt Series of northwestern Montana with a syenite body southwest of the adjacent to the altered pyroxenite and is associated with numerous syenite dikes that cut the pyroxenites.

OU2 gives the appearance of a delta formed by outflow from Rainy Creek. Well logs from the installation of the potable water well within the former Screening Plant subarea indicate an alluvial deposit: clay and sands from 0 to 14 feet below ground surface (bgs), gravels and sands from 14 to 67 feet bgs, and heaving fine sands from 67 to 75 feet bgs.

2.3.3 Soil

Soil is largely derived from the pre-Cambrian rocks, which break down to form loamy soil composed of sand and silt with minor amounts of clay. The Libby valley area is somewhat enriched in clays due to its river valley location, and the dense forest of the region contributes organic matter to the soil. Much of the original soil in the area now occupied by the town of Libby has been modified by human activities. These include addition of vermiculite from the Rainy Creek Complex to the soil, reworking of the soil during construction, road building, railroad operations, gardening, processing of vermiculite (i.e., expansion), and other activities. Soil generally varies in color from tan to gray to black.

The United States Department of Agriculture National Resources Conservation Services describes much of OU2 as andic dystrochrepts, alluvial terraces. As detailed in Section 2 of the RI report (CDM 2009), much of the soil at the surface of OU2 is topsoil imported to the site during restoration activities. The surface soil is underlain by stratified alluvial deposits of sand, silt, and gravel (as seen during installation of the potable water well).

2.3.4 Surface Water Hydrology

The Kootenai River, which flows adjacent to the site, has its origins in British Columbia's Kootenay National Park in Canada. From there it flows 485 miles into northwest Montana and through the towns of Libby and Troy. From there it flows into northern Idaho, then back into Canada and Kootenay Lake. Ultimately it joins with the Columbia River. Sixteen miles north of Libby, the river is held back by Libby Dam, creating a 90-mile long reservoir called Lake Koocanusa which reaches into Canada (LibbyMT.com. 2007).

Rainy Creek flows through the former Screening Plant subarea of the OU. Rainy Creek headwaters form in the Kootenai National Forest, approximately 3 miles north of Vermiculite Mountain (United States Geological Survey 1983). Rainy Creek flows perennially, with discharge into the Kootenai River. The lower reach that flows through OU2 is owned by the State of Montana.

The lower portion of Rainy Creek was restored with several step pools to facilitate fish migration. The records maintained by the Montana Department of Natural Resources and Conservation for ownership of state water rights indicate that the current owners of the former Screening Plant claim provisional water rights to divert surface water from Rainy Creek for irrigation, industrial, and commercial uses. The owners also own the riparian property rights associated with the riparian lands along lower Rainy Creek. It is expected that Rainy Creek will continue to sustain a viable fish population; however, is unknown whether public access to the lower reach will be allowed in the future.

As previously stated, Libby has a relatively moist climate with annual valley precipitation slightly over 20 inches. Higher elevations receive significantly more precipitation and account for much of the creek flow. Seasonal fluctuations cause varying levels of runoff and creek flow. Typically, runoff is most significant in spring when snow at higher elevations begins to melt. Summer precipitation does occur; however, typical summer weather is hot and dry and creek flow is moderated by high elevation lakes.

2.3.5 Hydrogeology

The Libby basin is hydrologically bound to the west by the pre-Cambrian bedrock, to the north by the Kootenai River and to the east by Libby Creek. The southern boundary of the basin extends under the high terrace of glacial lake bed sediments and with the alluvium of Libby Creek (Woodward-Clyde Consultants 1988).

The sediments overlying bedrock in the vicinity of the town of Libby are of glacial, glaciofluvial or alluvial origins. The site stratigraphy is characterized by lenses of interbedded units consisting of gravels, sands, and silty to clayey gravels and sands. These units are the result of numerous episodes of alluvial and glacial erosion and deposition. Types of depositional environments likely to have existed in the Libby area include braided stream, overbank, splay, point bar, till, moraine, outwash, loess (Aeolian), channel, and lucustrine. These environments moved in time and space, occurred contemporaneously, cancelled each other out (by erosion) and varied drastically in the level of energy and capacity to sort the available clastic material (Woodward-Clyde Consultants 1988).

During the installation of the potable water wells within the former Screening Plant subarea, the static groundwater level was observed at 24 feet bgs within the alluvial aquiver that underlies the site.

2.3.6 Demography and Land Use

Only the former Screening Plant subarea is currently used. All other subareas are currently vacant undeveloped land with no current plans for development of other property uses.

At the former Screening Plant, all buildings were demolished during removal activities. Privately-owned garage and a shed were constructed in 2004 within the boundary of the former Screening Plant after removal actions were completed. The site is currently privately owned and is being used for residential purposes. It is anticipated that the property will continue to be used for residential and/or commercial purposes. Recreational users could access the Flyway subarea of the site via the Kootenai River.

Based on the most recent population estimates available, approximately 2,600 people reside within the city limits of Libby, and approximately 11,000 people reside in the general area of Libby (zip code 59923), which includes the populated areas outside the city limits.

2.4 Summary of Nature and Extent of Contamination

This section discusses the nature and extent of contamination of LA at the site. Distribution of contaminated soil at the site is shown in Figures 2-2 and 2-3. Extent of soil covers placed during the interim remedial action are presented in Figure 2-4.

The CSM for current and future receptors at OU2 indicate the potential contaminated media of concern for OU2 include: outdoor air near highways, indoor air, dust in air of vehicles, outdoor air near disturbed soil, general (ambient) outdoor air, and dust in air from disturbances of roofing or other outdoor surfaces. Of these media of concern, only the following have exposure pathways that are considered complete (posing a significant potential risk by inhalation): outdoor air near highways, indoor air, outdoor air near disturbed soil, and general (ambient) outdoor air. The other media have pathways are incomplete (exposure by inhalation is minimal when compared to other pathways).

The following summarizes the observations and key findings related to the nature and extent of LA at OU2 that is most relevant to the current status of the site, and presented for each of the contaminated media with a complete pathway as identified in the CSM (Figure 2-1) (see Section 6 of the RI report (CDM 2009) for further details regarding estimated risks):

- *<u>LA in outdoor air near highways</u>* – LA-contaminated surface soil along the highway adjacent to OU2 has been removed, with the possible exception of outdoor air near disturbed soil in an isolated portion of the Highway 37 ROW in the Flyway.

- *<u>LA in indoor air and dust</u>* - Any LA-contaminated soil that would lead to contamination of indoor air or dust with LA is contained below an engineered cover placed during previous removal actions conducted at the site as described in Section 1.5.

- LA in general outdoor ambient air - The total LA concentration in outdoor ambient air has been observed at levels ranging from non-detect (ND) to 0.00004 structures per cubic centimeter (s/cc) in the two sample locations closest to OU2 (EPA 2009).

- LA in outdoor air near disturbed soil - Surface soil at the site has undergone extensive removal and any contaminated material is underneath an engineered cover between 1 to 4 feet thick. Two exceptions where LA-contaminated soil is still exposed at the surface are located within the Flyway. The first location is surface soils represented by sample 1-03000 (approximately 10,000 square feet). This surface soil sample had a result of <1% and was not removed during the emergency response actions. The other exception is an isolated portion of the Highway 37 ROW where LA was found at a concentration of >1% at a depth of <1 foot.

- LA in soil – Vermiculite and LA-containing soil is known to exist in the subsurface and is contained below engineered cover placed during the removal activities.

2.5 Summary of Sampling and Analysis Methods

Various sampling and analysis methods were used to determine the presence of asbestos fiber in different media, such as soil, dust, and air. The following list provides examples of these types of methods that were implemented as part of the remedial activity and risk assessment evaluation at the site:

- Activity-based sampling (ABS) – ABS simulates routine activates that would be conducted by users of the site to estimate potential exposures. Personal air samples are collected from contractors engaged in an activity and the sample analyzed for asbestos fibers using transmission electron microscopy (TEM) analysis.

- Ambient air sampling – Ambient air sampling is completed by establishing stationary air monitoring stations within the vicinity or downwind of contaminated areas and collecting continuous air samples using a pump and air filtering cassette. The purpose of ambient air sampling is to determine the extent of friable asbestos fiber release from the soil. Weather data is also collected to correlate climatic condition with measured releases of asbestos fibers. Samples are analyzed for asbestos fibers using TEM analysis.

- Personal Air Monitoring – Personal air samples are collected from the breathing zones of the event participants during various activities (intrusive and/or non-intrusive) in accordance with EPA-LIBBY-01. Samples are collected at two flow rates using two different types of pumps during each two-hour event, with a new sample started at the beginning of each new period. The flow rates for sample collection should be 10 liters per minute (L/min) and 3.5 L/min resulting in target volumes of 1,200 liters (L) and 420 L, respectively. Both the high volume and low volume samples are then submitted to the laboratory for analysis using TEM.

- Polarized light microscopy (PLM) with stereomicroscopy analysis – Soil samples are analyzed using EPA/600/R-93/116 with a modified protocol that uses a combination of PLM and stereomicroscopy analysis to identify bulk asbestos containing material (ACM) and/or asbestos fibers that may be present in soil.

- Visual inspection – A visual inspection of ACM is completed by first designating inspection areas to establish a boundary around the inspection zone. The soil is then visually inspected for ACM material using an intrusive or non-intrusive method, described as follows:

  - Non-Intrusive Visual Inspection: A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of ACM debris.

  - Intrusive Visual Inspection: An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of ACM debris.

2.6 Summary of Site Characteristics

LA has been observed in all the media sampled at the site: indoor air, indoor dust, outdoor ambient air, outdoor air near disturbed soil, and soil (surface and subsurface). All complete exposure pathways have been broken through the previously completed removal actions or through investigation been found to be below levels of concern, with the possible exception of outdoor air near disturbed soil in an isolated portion of the Highway 37 ROW and the area surrounding sample location 1-03000. The following Exhibit 2-1 summarizes the status of each exposure pathway within OU2: (for additional information refer to the RI report [CDM 2009]):

Exhibit 2-1. Summary of Post Interim Remedial Action Representing the Current Status of Risks at OU2

Media/ Exposure Pathway	Status
Outdoor Air Near Highway Adjacent to OU2	Mitigated through interim remedial actions, with the exception of an isolated portion along the Highway 37 ROW in the Flyway with >1% LA at <1 foot bgs.
Indoor Air	Mitigated through interim remedial action.
Dust in Air of Vehicles	Pathway is incomplete and believed to negligible when compared to other pathways.
General Ambient Air	Investigation results indicate this pathway is not a concern
Outdoor Air Near Disturbed Soil	Mitigated through removal actions, with the exception of an isolated portion along the Highway 37 ROW with >1% LA at <1 foot bgs, and the 10,000 square foot area surrounding sample location 1-03000 with LA at <1%. Both of these locations are within the Flyway.
Inhalation of Dust in Air from Disturbances of Roofing or Other Outdoor Surfaces	Pathway is incomplete and believed to negligible when compared to other pathways.
Soil	Majority of residual contamination is present at depths greater than or equal to 4 feet bgs under engineered cover.

Based on the information currently available and presented in the RI report (CDM 2009), the following conclusions have been drawn regarding OU2, as related to the data that represent the current status of the site:

- All complete exposure pathways have been broken through the previously completed removal actions or through investigation been found to be below levels of concern, with the possible exception of outdoor air near disturbed soil in an isolated portion of the Highway 37 ROW and in the area surrounding sample location 1-03000. Both of these locations are within the Flyway (Subarea 2).

- The ambient air concentrations observed at OU2 indicate a risk range related to ambient air at OU2 to be between 5E-08 and 1E-07 (EPA 2009).

- Vermiculite-containing soil is known to exist in the subsurface and is contained below engineered caps placed during the removal activities.

- The majority of residual contamination is present at depths greater than or equal to 4 feet bgs and in several isolated areas at depths less than 4 feet bgs within the former Screening Plant subarea north of Rainy Creek.

- The majority of the excavated areas within the Flyway met EPA's clearance criteria (<1% LA at depth) at depths varying from less than 1 foot bgs to greater than 4 feet bgs. However, LA concentrations ≥1% have been detected in confirmation soil samples collected at the eastern boundary of the Flyway within the Highway 37 ROW at depths less than 1 foot bgs up to 2 feet bgs. LA was observed in surface soils in one area (area surrounding sample 1-03000) not previously remediated at concentrations of <1%.

- Within the Flyway portion of the Highway 37 ROW is an isolated area with concentrations of LA of >1% at less than 1 foot bgs.

- The majority of Subarea 3 does not contain residual contamination; however, one confirmation soil sample collected along the north portion of the property contained <1% LA at a depth of 1 foot bgs.

- Residual contamination is present along the Rainy Creek Road Frontages at a depth between 1 and 2 feet bgs.

- Air data collected in OU2 (before and during cleanup) and in other parts of the Libby Superfund site establish that disturbance of soils that contain vermiculite and LA can lead to the release of LA fibers into air, and this would increase the risk of cancer in any people who were exposed on a regular basis.

2.7 Summary of Baseline Risk Assessments

Pursuant to federal regulations (National Oil and Hazardous Substances Pollution Contingency Plan [NCP] Part 300.430(d)(2)), EPA is required to:

> "…characterize the nature of and threat posed by the hazardous substances and hazardous materials and gather data necessary to assess the extent to which the release poses a threat to human health or the environment…"

This section summarizes the findings of the BLRA performed for OU2 of the Libby Asbestos Superfund Site.

2.7.1 Baseline Human Health Risk Assessment

2.7.1.1 Scope of the Assessment

The BLRA, using the available data estimated and evaluated the potential health risks to people who may be exposed to LA while living, working or visiting in OU2, either now or in the future, based on the conditions that currently exist within OU2. The methods used to evaluate human health risks from asbestos are in basic accord with EPA guidelines for evaluating risks at Superfund sites (EPA 1989), including recent guidance (EPA 2008) that has been specifically developed to support evaluations of exposure and risk from asbestos.

It is also important to recognize that many people exposed to LA at OU2 likely will also be exposed to LA at other locations in and around Libby. While the risk assessment presented in the RI (CDM 2009) focused exclusively on exposures and risks that occur within OU2, the cumulative risks from exposure pathways that may occur in other OUs will be addressed in the future.

2.7.1.2 Exposure and Risk from Asbestos

Cleanup actions conducted previously at OU2 often involved contaminated surface soil been either capped or else removed to depths of up to 4 feet and backfilled with clean soil, but there are a number of areas where residual contamination remains (see Figure 2-3). Before this interim remedial action was conducted, the potential exposure pathways of potential concern included:

- Disturbance of LA-contaminated soil
- Disturbance of LA-contaminated waste along the highway
- Disturbance of LA-contaminated indoor dust
- Inhalation of general (ambient) outdoor air

Based on this information, the CSM for how people may be exposed to LA at OU2 under current site conditions, now and in the future, is presented in Figure 2-1. The key concepts are summarized below:

- In areas that have been remediated and where surface soil is either capped or backfilled with clean soil, there are no complete exposure pathways to LA at present.

- In locations where the surface soils have been remediated but residual contamination remains in subsurface soils, a number of potentially significant exposure pathways might become complete if future excavation or construction activities were to occur. These pathways include; (a) exposure of tradespersons (excavation workers) during and after the subsurface soil excavation work, and (b) exposure of on-site residents, workers or visitors to releases from post-construction surface soil contamination.

- In areas where surface soil has not been remediated and where vermiculite or LA contamination is present, exposures from soil disturbances could be of concern to all receptors.

Non-Cancer Risk
At present, the EPA is working to develop a reference concentration or RfC for inhalation exposure to LA, but this value is still under development and is not yet available for use in estimation of hazard quotient (HQ) values. Therefore, no quantitative evaluation of non-cancer risk was done during risk assessment. However, studies in Libby reveal that the incidence of asbestos-related non-cancer effects, including pleural calcification, pleural thickening and opacities, have increased in workers and residents (Armstrong et al. 1988, McDonald et al. 1986, Amandus et al. 1987b, Peipins et al. 2003, Muravov et al. 2005, Whitehouse 2004). These findings emphasize that, despite the inability to provide a quantitative HQ calculation at present, occurrence of non-cancer effects are a significant human health concern in the community.

Cancer Risk
The level of cancer risk that is of concern is a matter of personal, community, and regulatory judgment. In general, the EPA considers excess cancer risks that are below about 1E-06 to be so small as to be negligible, and risks above 1E-04 to be sufficiently large that some sort of remediation is desirable. Excess cancer risks that range between 1E-04 and 1E-06 are generally considered to be acceptable (EPA 1991b), although this is evaluated on a case by case basis, and EPA may determine that risks lower than 1E-04 are not sufficiently protective and warrant remedial action. Note that risk management decisions generally consider the sum of all the risks contributed by differing exposure scenarios into account, rather than simply evaluating each one independently.

As mentioned above, methods for quantification of cancer and non-cancer risk from inhalation exposure to asbestos are still under development. However, risk predictions that are based on the best methods and data that are currently available. Based on the method described in EPA (2008) risks from asbestos in the ambient air indicated that lifetime excess cancer risks to area residents and workers were below EPA's level of concern (< 1E-06).

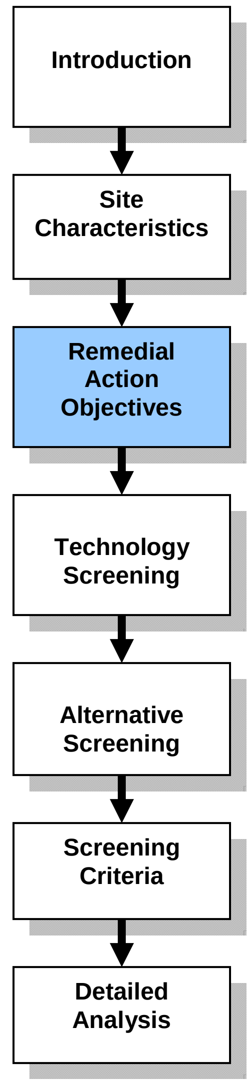
Most surface soils in OU2 have been remediated, and in these areas there are no complete exposure pathways of concern at present. However, there are isolated areas of the Flyway where current surface soil is known to be contaminated (an isolated portion of the Highway 37 ROW and area surrounding sample location 1-03000). In addition, residual vermiculite and LA are known to remain in subsurface soil in many locations. If contaminated subsurface soil were brought to the surface in the future, human exposure could become a concern at many locations across the OU. Although no data exist to support a quantitative evaluation of potential risks to humans who might disturb contaminated surface soil now or in the future, air sampling data from OU2 (prior to and during cleanup) and from other parts of the site indicate that human health risks might be unacceptable if contamination in soil became sufficiently extensive and human exposure was chronic.

2.7.2 Screening-Level Ecological Risk Assessment

A SLERA was not evaluated specific to OU2. A comprehensive assessment of ecological risks will be completed as part of OU3 (the mine site) of the Libby Asbestos Superfund Site.

Section 3
Remedial Action Objectives

Section 300.430(e) of the NCP requires the remedial alternative development process be initiated by developing preliminary remedial action objectives (PRAOs), identifying general response actions that address these PRAOs, and performing an initial screening of applicable remedial technologies. The goal of the remedy selection process is "to select remedies that are protective of human health and the environment, maintain protection over time, and minimize untreated waste."



The following sections present the PRAOs, the preliminary remediation goals (PRGs), and Applicable or Relevant and Appropriate Requirements (ARARs) that have been identified for the site.

3.1 Preliminary Remedial Action Objectives

PRAOs are media-specific and source-specific goals to be achieved through completion of a remedy that is protective of human health and the environment. These objectives are typically expressed in terms of the contaminant, the concentration of the contaminant, and the exposure route and receptor.

PRAOs are typically developed by evaluating several sources of information, including results of the risk assessments discussed in Section 2.7 and tentatively identified ARARs discussed in Section 3.3. These inputs provide the basis for determination of whether protection of human health and the environment is achieved for a remedial alternative.

Based on determinations of human health risks, LA present in vermiculite and/or soil are likely to poses a current exposure risk to human receptors through inhalation of fibers released during active soil disturbance activities and inhalation of fibers in outdoor (ambient) air. It is expected that any risk from potential future disturbances of subsurface LA-containing soil might be substantially higher than under current conditions if the buried vermiculite becomes exposed. Current site conditions are such that surface soils have either been capped or else removed and backfilled with clean soil as per the established removal clearance criteria for the interim remedial action, with the exception of an isolated portion of the Highway 37 ROW and area surrounding sample location 1-03000. Both of these locations are within the Flyway.

Non-cancer risks from inhalation of asbestos fibers have also been identified, but it is not evaluated quantitatively because a noncancer potency estimate is not currently available.

The PRAOs for the site presented below are initially based on anticipated future residential and/or commercial use of the site:

1. Mitigate the potential for inhalation exposures to asbestos fibers that would result in risks that exceed the target cancer risk range specified by EPA of 1E-06 to 1E-04.

2. Control erosion of contaminated soil by wind and water from source locations to prevent the spread of contamination to unimpacted locations and media.

3. Implement controls to prevent uses of the site that could pose unacceptable risks to human health or the environment or compromise the remedy.

3.2 Anticipated Future Land Uses

The current and anticipated future land uses for the site are an important consideration for the development of PRAOs to ensure remedial alternatives are protective of human health and the environment.

The OU2 site is divided into four subareas as shown on Figure 1-2; former Screening Plant (Subarea 1), Flyway (Subarea 2), Private Property (Subarea 3), and Rainy Creek Road Frontage (Subarea 4). Out of these four subareas only the former Screening Plant subarea is currently used, all other subareas are currently vacant undeveloped land with no current plans for future development.

The former Screening Plant subarea is currently privately owned and is being used for residential purposes. It is anticipated and assumed that this subarea will continue to be used for residential and/or commercial purposes.

Future land use for the Flyway (Subarea 3), and the Rainy Creek Road Frontage (Subarea 4) as shown on Figure 1-2 is assumed to be residential and/or commercial. All these subareas are currently vacant and undeveloped.

All subareas include portions of the Highway 37 embankments ROW which is maintained by the Montana Department of Transportation and is assumed to have non-residential use. Due to steep topography and locations within the ROW, it is anticipated that recreational and commercial use would be limited as well.

The final condition of the site after remediation must be considered in evaluating future land uses or activities and the related protection to human health that is provided. One of the primary methods to mitigate or limit the liberation of asbestos is to install an effective cover. Covers are an effective means for limiting/containing the asbestos liberation. Certain activities such as off-road vehicle use could compromise covers. To limit such activities several measures can be implemented such as engineered or institutional controls that could eliminate or limit the exposure risks to asbestos or preserve the effectiveness of covers.

The expectation and assumption in this FS report is that although the remedy measures put in place to protect human health and the environment would not allow unrestricted uses, they would be protective as contemplated in this FS (assuming the remedial measures put in place are kept intact). Land uses or activities that would compromise remedial measures would be considered unacceptable.

3.3 Preliminary Remediation Goals

PRGs are defined as the average concentration of a chemical or a contaminant in an exposure unit associated with a target risk level such that concentrations at or below the PRG do not pose an unacceptable risk.

PRGs have not been developed for the site at this time. The following reasoning describes why PRGs have not been developed for asbestos.

Sites with contamination that pose cancer risks that exceed 1 in 10,000 (or 1E-04) normally require remedial action; PRAOs have been established in Section 3.1 to address ACM that poses cancer risks in the ranges between 1 in 10,000 and 1 in 1,000,000 (1E-06).

Normally, PRGs would be developed by computing the concentration of asbestos in soil that corresponds to an excess cancer risk of 1E-04. However, such a computation is not possible at present because of the high variability in the relationship between asbestos in soil and asbestos in air. Even if the computations were possible, the ability to measure asbestos in surface and subsurface soil is presently limited by the available technologies and methods.

Noncancer risks from inhalation of asbestos fibers from ACM have also been recognized, but there is no current methodology to quantify noncancer risks for asbestos.

For these reasons, PRGs for asbestos have not been established for site soils. If the PRAOs for asbestos contamination are achieved through implementation of remedial measures as discussed in Sections 4 and 5, then risks to humans from inhalation exposures to asbestos are expected to be acceptable.

3.4 Applicable or Relevant and Appropriate Requirements

In accordance with Section 121(d) of CERCLA, 42 United States Code (U.S.C.) § 9621(d), the NCP, 40 Code of Federal Regulations (CFR) Part 300 (1990), and guidance and policy issued by EPA require that remedial actions under CERCLA comply with substantive provisions of ARARs from state and federal environmental laws, and state facility siting laws during and at the completion of the remedial action.

ARARs are designated as either "applicable" or "relevant and appropriate," according to EPA guidance, and may stem either from Federal or State Law. If a state or federal environmental law is determined to be either applicable or relevant and appropriate, compliance with the substantive requirements of that ARAR are mandatory under CERCLA and the NCP. Compliance with ARARs is a threshold criteria that any selected remedy must meet unless a legal waiver as provided by CERCLA Section 121(d)(4) is invoked.

EPA and DEQ have conducted discussions concerning potential federal and state ARARs and have tentatively identified regulations that may be applicable or relevant and appropriate to the site.

Appendix A provides the tentatively identified ARARs and detailed description of ARARs for the implementation of a remedial action at the site. The ARARs or group of related ARARs included in Appendix A are identified by a statutory or regulatory citation, followed by a brief explanation of the ARAR and how and to what extent the ARAR is expected to apply to potential activities to be conducted. The ARARs presented in Appendix A are tentative and are presented for the purpose of comparing remedial alternatives in this FS. The ARARs in this FS are not binding; final ARARs will be determined in the record of decision (ROD) as performance standards for any and all remedial design and subsequent remedial actions.

3.4.1 Definition of ARARs

3.4.1.1 Applicable Requirements

Applicable requirements specifically refer to cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental laws or state environmental and facility siting laws. These requirements address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site.

3.4.1.2 Relevant and Appropriate Requirements

Relevant and appropriate requirements specifically refer to cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental laws or state environmental or facility siting laws. These requirements are not directly applicable to hazardous substances, pollutants, contaminants, remedial actions, locations, or other circumstances at a CERCLA site but address problems or situations sufficiently similar (relevant) to those encountered at the CERCLA site such that their use is well suited to the particular site.

The determination that a requirement is relevant and appropriate is a two-step process that includes (1) the determination if a requirement is relevant and (2) the determination if a requirement is appropriate. In general, this involves a comparison of a number of site-specific factors, including an examination of the purpose of the requirement and the purpose of the proposed CERCLA action, the medium and substances regulated by the requirement and the proposed remedial action, the actions or activities regulated by the requirement and the remedial action, and the potential use of resources addressed in the requirement and the remedial action. When the analysis results in a determination that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable (EPA 1988).

3.4.1.3 To Be Considered

When ARARs are not fully protective, other federal or state policies, guidelines, or proposed rules capable of reducing the risks posed by a site can be implemented. These policies, guidance, guidelines, proposed rules or other sources of information are "to be considered" in the selection of the remedy and implementation of the ROD. Although not enforceable requirements, these documents are important sources of information that EPA and the state may consider during selection of the remedy, especially in regard to the evaluation of public health and environmental risks, or which will be referred to, as appropriate, in selecting and developing cleanup actions [40 CFR § 300.400(g)(3), 40 CFR § 300.415(I)].

3.4.1.4 Other Requirements

Many state requirements listed as ARARs are promulgated with identical or nearly identical requirements to federal law pursuant to delegated environmental programs administered by EPA and the state. The preamble to the NCP provides that such a situation results in citation to the state provision and treatment of the provision as a federal requirement.

There are other laws and regulations that have not been identified as ARARs for the site because they are not specifically related to environmental cleanup or facility siting. In most cases, the classification of a particular requirement as substantive or administrative will be clear, but some requirements may fall in the area between provisions related primarily to program administration and those concerned primarily with environmental and human health goals. Examples of other requirement sources of information are:

- *Occupational Health Act, Montana Code Annotated (MCA) 50-70-101 et seq., Administrative Rules of Montana (ARM) 17.74.101, ARM 17.74.102*

- *Employee and Community Hazardous Chemical Information Act, MCA 50-78-201, MCA 50-78-202, MCA 50-78-204*

3.4.2 Identification of ARARs

ARARs are defined as chemical-, location-, or action-specific. An ARAR can be one or a combination of all three types of ARARs.

Chemical-specific requirements address chemical or physical characteristics of compounds or substances on sites. These values establish acceptable amounts or concentrations of chemicals that may be found in or discharged to the ambient environment.

Location-specific requirements are restrictions placed upon the concentrations of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location-specific ARARs relate to the geographical or physical positions of sites, rather than to the nature of contaminants at sites.

Action-specific requirements are usually technology-based or activity-based requirements or limitations on actions taken with respect to hazardous substances, pollutants, or contaminants. A given cleanup activity will trigger an action-specific requirement. Such requirements do not themselves determine the cleanup alternative but define how chosen cleanup methods should be performed.

3.4.3 Waivers of Specific ARARs

CERCLA Section 121(d)(4) authorizes that any ARAR may be waived under one of the following six conditions if the protection of human health and the environment is assured:

- It is part of a total remedial action that will attain such level or standard of control when completed (i.e. interim action waiver).
- Compliance with the ARAR at a given site will result in greater risk to human health and the environment than alternative options that do not comply with the ARAR.
- Compliance with such a requirement is technically impracticable from an engineering perspective.
- The remedial action will attain a standard or performance equivalent to that required by the ARARs through use of another method or approach.
- The ARAR in question is a state standard and the state has not consistently applied (or demonstrated the intention to consistently apply) the ARAR in similar circumstances at other sites.
- In meeting the ARAR, the selected remedial action will not provide a balance between the need for protection of public health and welfare and the environment at the site and the availability of Superfund monies to respond to other facilities.

3.4.4 ARARs for Onsite and Offsite Actions

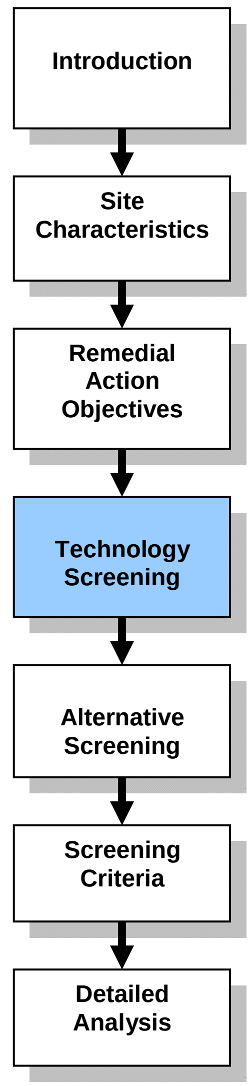
Onsite activities of a remedial action for the site do not need to comply with administrative requirements (including need for permits) contained in ARARs in accordance with Section 121(e) of CERCLA. However, the onsite activities must comply with all substantive requirements of the ARARs, including substantive permit requirements. The onsite portions of a remedial action include not only the contaminated area within the site boundary, but also all areas in very close proximity to the contamination necessary for implementation of the remedial action.

Offsite actions like hauling, disposal and borrow source development only require compliance with "applicable" ARARs, but compliance with both substantive and administrative components of the "applicable" ARARs is necessary.

Section 4
Identification and Screening of General Response Actions, Remedial Technologies, and Process Options

4.1 Overview

This section identifies general response actions (GRAs), remedial technologies, and process options that are potentially useful to address the PRAOs identified in Section 3 for the contaminated medium (contaminated soil). Screening of the GRAs, remedial technologies, and process options is then performed in accordance with the NCP to retain representative technologies and process options that can be assembled into remedial alternatives as discussed in Section 5.



The identification and screening process consists of the following general steps:

- Develop GRAs for the contaminated medium that will satisfy the PRAOs identified in Section 3.
- Compile remedial technologies and process options for each GRA that are potentially viable for remediation of the contaminated media.
- Screen the remedial technologies and process options with respect to technical implementability for the contaminated media at the site. Technologies and process options that are not technically implementable relative to the contaminated media are eliminated from further consideration in this FS.
- Evaluate and screen the retained remedial technologies and process options with respect to effectiveness, ease of implementability, and relative cost. Technologies and process options that have low effectiveness, low implementability, or high cost relative to the contaminated media are eliminated from further consideration in this FS.
- Combine and assemble the retained technologies and process options for the contaminated media into site-wide remedial alternatives as presented in Section 5.

The remainder of this section categorizes the contaminated media and evaluates GRAs, technologies, and process options that are potentially viable for addressing the PRAOs and ARARs discussed in Section 3.

4.2 Contaminated Media

Based on the RI report, the primary source of contamination at the site is LA. Vermiculite and LA are known to exist in subsurface soil. Most surface soils in OU2 have been remediated, where surface soil is either capped or backfilled with clean soil. Surface has been remediated but residual contamination remains in subsurface soil and it is know that when soil at the site is disturbed that LA becomes airborne and is available for inhalation.

Ecological risks were not evaluated for OU2. A comprehensive assessment of ecological risks will be completed as part of OU3 (the mine site) of the Libby Asbestos Superfund Site.

Soil containing LA or visible vermiculite at the site are herein referred to together as "contaminated soil" as the contaminated medium. Distribution of contaminated soil at the site is shown in Figures 2-2 and 2-3. Various remedial activities performed during the interim remedial action are presented in Figure 2-4

Contaminated subsurface soil is known to exist below the existing engineered exposure barriers (soil covers). Contaminated surface soil within the OU2 site has been removed to concentrations meeting EPA's removal clearance criteria (<1% LA at depth) and backfilled with clean cover soil. The contaminated subsurface soil below the excavation depths were contained in-place using soil covers which were constructed during the interim remedial actions performed between 2000 and 2006.

Within the former Screening Plant and Flyway subareas, the majority of residual subsurface contamination is present at depths below approximately 4 feet bgs. However there are two locations within the Flyway subarea (Subarea 2) that still have LA-contaminated soil exposed at the surface. One location consists of small isolated areas of the Highway 37 ROW embankment (Figure 2-3) within the eastern portion of the Flyway subarea which were not remediated due to concerns regarding integrity of highway pavement. These isolated areas within the Highway 37 ROW embankments have contaminated soil with concentrations >1% at depths less than 1 foot bgs. The other location is the area surrounding sample 1-03000 which was not previously remediated; LA was observed in this location at concentrations of <1% in surface soil.

Residual subsurface contamination is present within the Rainy Creek Road Frontage subarea (Subarea 4) at a depth between 1 and 2 feet bgs. The majority of the Private Property subarea (Subarea 3) does not contain contamination. However, a small portion of the property to the north had surface contamination that was addressed as part of interim remedial actions and currently has residual subsurface contaminated soil below soil covers at depths greater than 1 foot bgs.

Since the majority of the OU2 site has been remediated through a combination of removal/disposal and containment during the interim remedial action, it is assumed that surface soils in the former Screening Plant and Flyway subareas (apart from isolated areas containing contaminated surface soil within the embankments along the western side of Highway 37 and the area surrounding sample 1-03000) do not require additional remediation. This assumption was made for the purpose of comparing remedial alternatives during the FS process based on the generalized nature and extent of contamination presented in the RI Report. During remedial design and remedial action, the specific RI data will be taken into consideration with respect to design and implementation of the selected remedy.

4.3 General Response Actions

GRAs are initial broad response actions considered during technology screening to address the PRAOs for the contaminated medium identified at the site (i.e. contaminated soil). GRAs include several remedial categories, such as containment, removal, disposal, and treatment of contamination within the media. Site-specific GRAs are first developed to satisfy the PRAOs for the contaminated medium and then are evaluated as part of the identification and screening of remedial technologies and process options for the contaminated medium. It should be noted that not all GRAs identified for the contaminated medium are necessarily retained for inclusion within remedial alternatives for the site.

The GRAs considered for remediation of the contaminant medium (i.e. contaminated soil) include the following:

- No action
- Monitoring
- Institutional controls
- Engineered controls
- Containment
- Removal, transport, and disposal
- Treatment

No action leaves contaminant media in their existing condition with no control or cleanup planned. In accordance with the NCP, this GRA must be retained as a stand-alone remedial alternative to provide a baseline against which other options can be compared.

Monitoring involves physical measures applied to the site to determine if there is contaminant migration. Monitoring is not intended to substitute any engineering aspect of a selected remedy and does not physically address contaminants.

Institutional controls are administrative and legal restrictions intended to control or prevent present and future use of contaminated media. Institutional controls are not intended to substitute for engineering aspects of a selected remedy.

Engineered controls are physical restrictions intended to control or prevent present and future access to contaminant media.

Containment involves physical measures applied to contaminant media materials to control the release of contaminants and/or prevent direct contact or exposure to the contaminants.

Removal, transport, and disposal involve a complete or partial removal of contaminant media materials followed by transportation and disposal of the media materials at an onsite/offsite location.

Treatment involves biological, chemical, thermal, and/or physical measures applied to the contaminant media materials that reduce toxicity, mobility, and/or volume of the contaminants present.

4.4 Identification of Remedial Technologies and Process Options

In this step of the FS process, remedial technology types and process options that are capable of addressing the contaminated medium are identified and organized under each GRA listed in Section 4.3. This section provides potentially viable remedial technologies and process options for the contaminated medium.

Potentially viable remedial technologies and associated process options identified for the contaminant medium (i.e. asbestos contaminated soil) are presented and described on Table 4-1.

4.5 Screening of Remedial Technologies and Process Options for Technical Implementability

The remedial technologies and process options presented on Table 4-1 were first evaluated and screened based on technical implementability. The preliminary screening was very broad, looking at the suitability of a technology for addressing the contaminated media. The primary source of information used to perform preliminary screening is the Federal Remediation Technologies Roundtable (FRTR) Remediation Technologies Screening Matrix and Reference Guide, Version 4.0 (FRTR 2007). Other sources of information used for preliminary screening include previous studies and work conducted at the site, published literature and vendor information, and engineering judgment based on other asbestos related remediation projects.

A given technology or process option was eliminated from further consideration in this FS on the following basis:

- Technical implementability if site conditions or site characterization data indicated that the technology or process option is incompatible with the contaminant or contaminated media or cannot be implemented effectively due to physical limitations or constraints at the site.

- Some of the process options may be technically implementable on a small-scale basis for a specific location; however, the technical implementability screening and elimination were performed by evaluating use of the process options for the contaminated media on a large-scale, site-wide basis.

Each of the process options identified in Section 4.4 for the contaminated medium has been screened to eliminate those that are not implementable technically at the site. The process options for the contaminant medium eliminated from further consideration in this FS (with the rationale for elimination) are indicated on Table 4-1, using grey shading.

Remedial technologies and process options that are not deemed to be technically implementable relative to the contaminated medium were eliminated from further consideration. Retained technologies and process options were then carried forward to the second step of the evaluation process as discussed in Section 4.6.

4.6 Evaluation of Remedial Technologies and Process Options for Effectiveness, Implementability, and Relative Cost

Each of the technically implementable remedial technologies and process options retained from the preliminary screening process presented in Section 4.5 were further evaluated in the second step of the screening process for effectiveness, implementability, and relative cost. The criteria used, as defined in this step of the FS process, are described below.

Effectiveness
This evaluation of the effectiveness of a remedial technology or process option focuses on:

- Potential effectiveness in handling the estimated volumes of contaminated media and meeting the goals identified in the PRAOs
- Potential impacts to human health and the environment during construction and implementation
- How proven the remedial technology or process option is with respect to the contaminants and conditions at the site

Implementability
Technically implementable technologies and process options retained in Section 4.5 are evaluated with respect to both the technical and administrative feasibility of implementing a remedial technology or process option. Technical implementability was used as an initial screening step in Section 4.5 to eliminate remedial technologies and process options that were clearly ineffective or unworkable at the site. This subsequent screening criterion places greater emphasis on the institutional aspects of implementability. This criterion focuses on:

- Ability to obtain permits for offsite actions
- Availability and capacity of treatment, storage, and disposal services
- Availability of necessary equipment and skilled workers

Relative Cost

Cost plays a limited role in the screening of remedial technologies and process options. Relative capital and operations and maintenance (O&M) costs are used rather than detailed estimates. The cost analysis is evaluated based on engineering judgment and is ranked relative to other process options in the same technology type.

Each remedial technology or process option was qualitatively evaluated using these three criteria to determine whether they should be eliminated from further consideration in the FS or retained for assembly into remedial alternatives. The following qualitative rating system was used in conjunction with the stated rationale to provide a justification for the ratings with respect to each criterion:

Effectiveness and Implementability		Relative Cost	
⓿	**None**	⓿	**None**
❶	**Low**	$	**Low**
❷	**Low to Moderate**	$$	**Low to Moderate**
❸	**Moderate**	$$$	**Moderate**
❹	**Moderate to High**	$$$$	**Moderate to High**
❺	**High**	$$$$$	**High**

Remedial technologies or process options deemed to have low effectiveness, low administrative implementability, and/or high relative cost for the contaminated medium are eliminated from further consideration in the FS.

Each of the process options retained from the first screening step presented in Section 4.5 for the contaminant medium has been evaluated using effectiveness, implementability, and relative cost and is presented on Table 4-2. This evaluation and screening process is inherently qualitative in nature. The evaluation criteria described in Section 4.6 are specified by EPA guidance; however the degree to which the criteria are weighted against each other are not specified. Determination of how the individual evaluation criterion should influence the overall rankings is subjective and based on site-specific considerations and professional judgement.

The factors considered for each of the three criterion that provide justification for retention or elimination are rated using the qualitative ratings system previously described and summarized on the tables. The process options for contaminant medium eliminated from further consideration in this FS (with the rationale for elimination) are indicated on the tables using grey shading.

4.7 Retained GRAs, Remedial Technologies, and Process Options

Based on the results of the two-step screening process described in Sections 4.5 and 4.6, a reduced number of remedial technologies and process options for the contaminated medium were retained for further evaluation and the development of remedial action alternatives as discussed further in Section 5. These retained remedial technologies and process options are presented on Table 4-3.

Remedial technologies and process options identified to address the contaminated medium are retained for the following reasons:

- Remedial technologies/process options that can be used as a stand-alone remedy.
- Remedial technologies/process options that can be used in combination with other remedial technologies to address specific site issues or conditions.

It is unlikely that using or applying a single remedial technology/process option to the contaminated medium will solely be able to achieve the PRAOs or comply with ARARs. Thus, use of various remedial technologies/process options in combination is likely necessary. While this approach is conceptually addressed as part of the identification and screening of remedial alternatives discussed in Section 5, combinations of GRAs to address specific site issues not discussed within the FS will be addressed during selection and implementation of a remedy for OU2 in consultation with the community and the State of Montana.

Conventional Remedial Technologies/Process Options for Contaminated Soil
Conventional methods for remediation of soil contaminated with asbestos involve monitoring, exclusion from asbestos-contaminated areas and/or removing, transporting or containing (isolating) contaminated materials to eliminate airborne transport of asbestos fibers. The following conventional methods are involved in remediation strategies for asbestos contamination in soil included in this FS:

- Monitoring
  - Non-Intrusive Visual Inspection
  - Intrusive Visual Inspection
  - Sample Collection and Microscopic Analysis
- Institutional Controls
  - Governmental Controls, Proprietary Controls, and Informational Devices
  - Information and Education Programs
- Engineered Controls
  - Fencing and Posted Warnings
- Containment
  - Water-Based Suppression
  - Chemical-Based Suppression
  - Soil or Rock Exposure Barrier/Cover
  - Asphalt or Concrete Exposure Barrier/Cover
  - Geosynthetic Multi-Layer Exposure Barrier/Cover

- Removal - Mechanical Removal (Excavation)
- Transport - Mechanical Transport (Hauling/Conveying)
  - Pneumatic Transport (Vacuum Truck/Pumping)
- Disposal - Offsite Disposal

Innovative Remedial Technologies/Process Options for Contaminated Soil
Several innovative remedial technologies/process options were evaluated during the screening process and warranted further consideration. One of these new remedial technologies/process options retained for assembly into remedial alternatives includes:

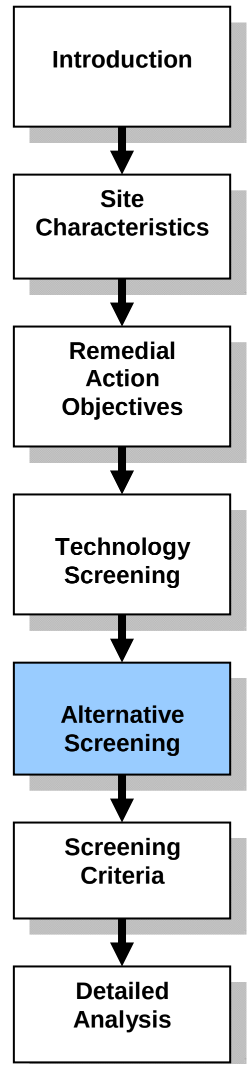
- Treatment - Thermo-Chemical Treatment

Conventional and innovative remedial technologies/process options for contaminated soil are used in various combinations for assembly of remedial alternatives as discussed in Section 5.

Section 5
Development and Screening of Alternatives

5.1 Overview

In this section, remedial action alternatives (herein referred to as remedial alternatives) are assembled by combining the retained remedial technologies and process options presented in Section 4 for the contaminated medium. Remedial alternatives are developed from either stand-alone process options or combinations of the retained process options.



These remedial alternatives are then screened using a qualitative process with standard evaluation to determine overall effectiveness, implementability, and cost. The purpose of alternative screening is to reduce the number of remedial alternatives retained for detailed analysis in Section 7.

The remedial alternatives for the site span a range of categories defined by the NCP as follows:

- No action alternative
- Alternatives that address the principal threats but involve little or no treatment; protection would be by prevention or control of exposure through actions such as containment and/or engineering and institutional controls
- Alternatives that, as their principal element, employ treatment that reduces the toxicity, mobility, or volume of the contaminants
- Alternatives that remove or destroy contaminants to the maximum extent, eliminating or minimizing long-term management
- Alternatives that include innovative treatment technologies

5.2 Assumptions Affecting Development of Remedial Alternatives

Several fundamental assumptions affect the development of remedial alternatives evaluated in this FS (other than a "no action alternative"). These assumptions are driven by requirements of the PRAOs identified in Section 3 and site limitations and constraints that can not be overcome by using one or more remedial technology/process options as described in Section 4. These fundamental assumptions were taken into consideration during development of remedial alternatives for this FS and include the items listed in Exhibit 5-1:

Exhibit 5-1. Assumptions Affecting Development of Remedial Alternatives

Fundamental Assumption	Rationale
Exclusion of Residual Subsurface Contamination Addressed During the Interim Remedial Action	Interim remedial actions were performed in the former Screening Plant and Flyway subareas between 2000 and 2006 which included removal and offsite disposal of contaminated soil present onsite above removal clearance criteria. Soil covers were constructed over the remaining residual contaminated soil (Figure 2-4). It is assumed that areas addressed through removal and containment remedies during the interim remedial actions are remediated, and that alternatives for these areas would focus on protection of the existing remedy (soil covers).
Locations which are Seasonally Flooded by the Kootenai River	There are two isolated locations on the west portion of the Flyway Subarea along the Kootenai River (Figure 2-3) which have not been investigated or characterized for LA contamination. Since no investigation has been performed within these locations, it is assumed for this FS that these areas do not require active remediation. However these areas will be monitored and access controlled as part of the overall remedy for the Flyway subarea.
Inclusion of LA Contamination in Surface Soil at Two Locations within Flyway Subarea which were not Addressed During the Interim Remedial Action	There are two locations within the Flyway Subarea that have surface soils contaminated with LA but were not addressed during the interim remedial action. The first location includes isolated embankment areas within the ROW for Highway 37 which was not remediated to the established removal clearance criteria during the interim remedial action due to concerns regarding integrity of highway pavement. The second location includes LA contamination observed within the south-central portion of the Flyway subarea. Specifically, LA was detected at concentrations of <1% in surface soil in the area surrounding sample 1-03000. Since LA-contaminated surface soil still exists at these locations and was not remediated per the interim remedial action protocol, it is assumed that the FS must evaluate remedial measures for these areas.
Engineered Controls as an Essential GRA Component of All Alternatives	During the interim remedial action, engineered controls (fencing and signage) were implemented for portions of OU2 that were addressed through containment (covers) and are still present. In addition, there are two isolated locations (seasonally flooded areas) on the west side of the Flyway Subarea along the Kootenai River (Figure 2-3) that have not been investigated but could potentially contain LA contamination. Engineered controls are assumed to be required to protect human health in these areas until conclusions can be made during remedial design about the presence or absence of LA contamination. Thus, it is assumed that engineered controls for these portions of OU2 would be evaluated as an essential GRA component of all remedial alternatives except for Alternative 1 (the “no action” alternative required by the NCP).
Institutional Controls and Monitoring are Essential GRA Components of All Alternatives	Because of the potential future land uses described in Section 3 and residual contaminated subsurface soil that would remain in place below remedy components (placed during the interim and final remedial actions) that could be exposed in the future, institutional controls would be required to prevent or restrict any activity or use that might pose a risk or compromise a remedy component due to the land uses. Monitoring would be required to determine protectiveness of the remedy and to ensure that the remedy components are not compromised in the future. Thus, it is assumed that institutional controls with monitoring are essential GRA components of all remedial alternatives except for Alternative 1 (the “no action” alternative required by the NCP).

Exhibit 5-1. Assumptions Affecting Development of Remedial Alternatives (continued)

Fundamental Assumption	Rationale
Future Land Use is Considered to be Residential and/or Commercial	Future land use for all OU2 subareas (Former Screening Plant (Subarea 1), Flyway (Subarea 2), Private Property (Subarea 3), and Rainy Creek Road Frontage (Subarea 4)) as shown on Figure 1-2 is assumed to be residential and/or commercial under all remedial alternatives. However, future land use for embankments within ROWs at OU2 is assumed to be non-residential. Actual residential or commercial use of the embankments is restricted due to steep topography and location within the right-of ways for Highway 37.
Status of Risk Assessments in Alternative Development	Except two locations where current surface soil is known to be contaminated, most surface soil in OU2 have been remediated and in these areas there are no complete exposure pathways of concern at present. However, residual vermiculite and LA are known to remain in subsurface soil in many locations. If contaminated subsurface soil were brought to the surface in the future and became sufficiently extensive and human exposure was chronic, then human health risks might be unacceptable. Ecological risks were not evaluated for OU2. A comprehensive assessment of ecological risks will be completed as part of OU3 (the mine site) of the Libby Asbestos Superfund Site. It is assumed for this FS that risks to ecological receptors at OU2 are minimal and would be mitigated through implementation of remedial alternatives that address human health risks. Based on the BLRA, conceptual site model (Figure 2-1), and previous remediation activities conducted at the Libby Asbestos Site, it is assumed that contaminated soil located onsite poses an exposure risk to human receptors primarily through inhalation of asbestos fibers when contaminated soil is disturbed.
Remedy Component Assumptions for Covers and Excavation/Disposal Consistent with Previous Interim Remedial Actions Performed for the Libby Asbestos Site	Numerous removal actions and interim remedial actions have been performed at the Libby Asbestos Superfund Site to address contamination posing an imminent risk to human health and the environment. Protocols for both covering contaminated soil and excavation and offsite disposal of contaminated soil have been previously developed as part of these actions, so it is assumed that remedy components such as covers or removal/disposal of contaminated soil will be consistent with these protocols. For FS evaluation purposes it is assumed that new protective covers would be comprised of soil. Alternative cover types may be considered during design and implementation of the selected remedy, consistent with evaluations of cover types within the technology screening of the FS. Removal activities previously conducted at the Libby Asbestos Superfund Site involved an iterative process. Initial excavation depth was 12 inches. Depending upon the confirmatory soil sampling results, an iterative excavation and sampling process continued to a maximum depth of 36 inches. For FS evaluation purposes, it is assumed that excavation/disposal alternatives would follow this protocol.

Exhibit 5-1. Assumptions Affecting Development of Remedial Alternatives (continued)

Fundamental Assumption	Rationale
Compliance with Standards for Degree of Cleanup Included in National Emissions Standards for Hazardous Air Pollutants (NESHAP) - 40 CFR Part 61 Subpart M	NESHAP (40 CFR Part 61 Subpart M), specifically 61.151(a)(2) and (3), sets the standard for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations. EPA has determined that regulations within 40 CFR Part 61 Subpart M are relevant and appropriate ARARs for the site. 61.151(a)(2) and (3) provide standard thicknesses for vegetated and non-vegetated covers used for control of asbestos wastes at these types of sites. However 61.151(c) allows alternative control methods other than those required under 61.151(a)(2) and (3) if prior approval of the EPA Administrator is obtained. For consistency with previous removal/interim remedial activities conducted at the Libby Asbestos Superfund Site, EPA has determined that alternative thicknesses for covers are justified and are protective of human health and the environment. For FS evaluation purposes, soil cover thicknesses are assumed to be 18 inches (12 inches of subsoil and 6 inches of topsoil). Excavation backfill depths are assumed to be 12 inches (6 inches of subsoil and 6 inches of topsoil). All alternatives (except Alternative 1 and 2) presented in this FS would be in compliance with this ARAR as allowed under 40 CFR 61.151(c).
Comprehensive Approach of GRAs within Alternatives	The GRAs provided within the alternatives address the contaminated soil and risks this medium poses for the site as a whole (i.e. a separate approach for individual subareas with similar conditions was not taken for alternatives evaluation). Combinations of GRAs to address specific site related issues not discussed within the FS will be addressed during selection and implementation of a remedy for OU2 in consultation with the community and the State of Montana.
Exclusion of Contingency Remedial Measures from Screening and Evaluation	Based on the exposure risk to human receptors identified in the BLRA, it is assumed for FS purposes that monitoring (consisting of inspections) will be required to determine protectiveness of the remedy after implementation and the need for future additional remedial measures (if any). These additional remedial measures are excluded from the screening and evaluation of remedial alternatives since they would be considered a contingency measure only if the primary remedy component were to fail.
30-year Period of Evaluation for all Alternatives	A default 30-year period of evaluation has been selected for all remedial alternatives. This is based on the rationale that all remedial alternatives will require an indefinite duration of operations and maintenance due to implementation of institutional controls and monitoring. However, evaluation of long durations of operations and maintenance is cumbersome and is generally not necessary for comparative evaluation between alternatives due to cost discounting under present value analysis.

Secondary factors and considerations for alternative evaluation have also been tentatively identified; however they are not critical to initial identification and screening of remedial alternatives. Since these considerations vary depending on the remedial approach used in each alternative, they are discussed in Section 7 for retained remedial alternatives.

5.3 Description of Remedial Alternatives

Remedial alternatives were assembled by combining the retained remedial technologies and process options. Table 5-1 provides a comprehensive list of the remedial technologies/process options that were used to develop each remedial alternative. The fundamental site assumptions and factors described in Sections 5.2 were also considered during development of the remedial alternatives.

The remedial alternatives evaluated for OU1 site include:

- Alternative 1: No Action
- Alternative 2: Institutional and Engineered Controls with Monitoring
- Alternative 3a: In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring
- Alternative 3b: In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring
- Alternative 4: Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring
- Alternative 5: Removal of Contaminated Soil within the Flyway Subarea, Offsite Thermo-Chemical Treatment and Reuse of Treated Material, Institutional and Engineered Controls with Monitoring

The following subsections provide generalized descriptions of the remedy components for remedial alternatives to be evaluated during the screening process presented in this section. Detailed information for remedy components, including but not limited to specific quantities of contaminated materials and frequency and types of samples collected for analysis, are discussed in Section 7 for the alternatives retained after screening.

5.3.1 Alternative 1: No Action

A "no action" alternative is required by the NCP to provide an environmental baseline against which impacts of the various remedial alternatives can be compared.

This alternative would discontinue all current remedial activities and no further action would be taken at the site for contaminated soil to address the associated risks to human health or the environment.

Five-year site reviews would be performed as required by the NCP to evaluate whether adequate protection of human health and the environment is provided. Monitoring (consisting solely of visual inspections) would be performed as necessary to complete the 5-year site reviews.

5.3.2 Alternative 2: Institutional and Engineered Controls with Monitoring

Alternative 2 provides protection of human health through institutional controls (legal and administrative controls) coupled with engineered controls (physical controls such as fencing and signage) to restrict access and use of areas containing residual contaminated soil remaining after the interim remedial actions. Monitoring would be performed to ensure that these controls are protective of human health.

Institutional controls would be implemented to prevent or restrict any activities or uses of the site which could pose a risk to human receptors. Engineered controls would consist of physical barriers, such as fencing along with warning signs, to exclude access to the site and areas with contaminated soil. Engineered controls currently exist at the site to protect covers placed as part of the interim remedial actions. However additional engineered controls would specifically be placed around the two locations within the Flyway Subarea that have identified contamination in surface soils as well as seasonally flooded areas located within Flyway Subarea where presence or absence of LA contamination is unknown. Monitoring (consisting of inspections) would be performed to determine protectiveness of the remedy after implementation and to ensure that the remedy components are not compromised in the future.

The protectiveness of this alternative would be maintained by conducting each of the following on a periodic basis:

- Long-term O&M would be performed to maintain the integrity of the engineered controls such as fencing and signage. As part of the O&M, institutional controls would be evaluated and updated if necessary to ensure protectiveness.
- Monitoring (consisting of inspections with sampling and microscopic analysis using methods such as those discussed previously in Section 2.5) would be performed to ensure that protection of human health is maintained for areas outside of the fenced areas.
- Five-year site reviews would be performed since contaminated soil is left in place, preventing unrestricted use of the site.

5.3.3 Alternative 3a: In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

Alternative 3a provides protection of human health through in-place containment (protective covers) to address risks to human receptors from contaminated soil within two isolated locations of the Flyway subarea. These two locations include the west embankment of Highway 37 and the area surrounding sample location 1-03000. Institutional controls coupled with engineered controls as described for Alternative 2 would also be implemented to restrict access and use of areas containing residual contaminated soil remaining after the interim and final remedial actions, including the seasonally flooded areas located within Flyway Subarea where presence or absence of LA contamination is unknown.

Protective covers used for in-place containment are assumed to be constructed from clean soil transported from an offsite borrow source outside of Libby valley tested for contamination. This assumption would be refined at the time of remedial design.

The institutional controls would be provided to prevent or restrict any activities or uses of the entire site which could pose a risk to human receptors and to protect the remedy (protective covers) put in place during interim remedial actions and as part of this alternative.

Engineered controls consisting of physical barriers (fencing) along with warning signs currently exist at the site to protect covers placed as part of the interim remedial actions. Additional engineered controls would also be placed to exclude access to the seasonally flooded areas located within Flyway Subarea. Monitoring would be performed as described for Alternative 2.

The protectiveness of this alternative would be maintained by conducting each of the following on a periodic basis:

- Long-term O&M would be performed to maintain the integrity of the engineered controls and protective covers. As part of the O&M, institutional controls would be evaluated and updated if necessary to ensure protectiveness.

- Monitoring (consisting of inspections such as those discussed previously in Section 2.5) would be performed to ensure that the integrity of the remedy components (protective covers) placed at the site are intact and that protection of human health is maintained within the site.

- Five-year site reviews would be performed since contaminated subsurface soil is left in place below the protective covers, preventing unrestricted use of the site.

5.3.4 Alternative 3b: In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Alternative 3b provides protection of human health through in-place containment (protective covers) as well as removal and offsite disposal to address risks to human receptors from contaminated soil within two isolated locations of the Flyway subarea. These two locations include the west embankment of Highway 37 and the area surrounding sample location 1-03000. The location within the west embankment of Highway 37 would be contained in-place using protective covers and the location surrounding sample location 1-03000 would be excavated along with offsite disposal of contaminated soil. Institutional controls coupled with engineered controls as described for Alternative 3a would also be implemented to restrict access and use of areas containing residual contaminated soil remaining after the interim and final remedial actions, including the seasonally flooded areas located within the Flyway Subarea where presence or absence of LA contamination is unknown.

Protective covers used for in-place containment are assumed to be constructed from clean soil transported from an offsite borrow source outside of Libby valley tested for contamination. Removal of contaminated soil would be conducted to an assumed depth of 12 inches bgs. Removed soil would be transported offsite and placed within the former Libby vermiculite mine. Removal areas are assumed to be backfilled using clean soil. Clean soil used to backfill removal areas would be transported from an offsite borrow source outside of the Libby valley tested for contamination. These assumptions regarding in-place containment as well as removal and offsite disposal would be refined at the time of remedial design.

Institutional and engineered controls and monitoring would be performed similarly as discussed above for Alternative 3a.

The protectiveness of this alternative would be maintained by conducting each of the following on a periodic basis:

- Long-term O&M would be performed to maintain the integrity of the engineered controls and protective covers. As part of the O&M, institutional controls would be evaluated and updated if necessary to ensure protectiveness.

- Monitoring (consisting of inspections such as those discussed previously in Section 2.5) would be performed to ensure that the integrity of the remedy components (protective covers and backfilled excavations) placed at the site are intact and that protection of human health is maintained within the site.

- Five-year site reviews would be performed since contaminated subsurface soil is left in place below the protective covers and backfilled excavations, preventing unrestricted use of the site.

5.3.5 Alternative 4: Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Alternative 4 provides protection of human health primarily through removal (excavation) would be used to address risks to human receptors from contaminated soil within two isolated locations of the Flyway subarea. These two locations include the west embankment of Highway 37 and the area surrounding sample location 1-03000. Institutional controls coupled with engineered controls as described for Alternative 3b would also be implemented to restrict access and use of areas containing residual contaminated soil remaining after the interim and final remedial actions, including the seasonally flooded areas located within the Flyway Subarea where presence or absence of LA contamination is unknown.

Removal of contaminated soil would be conducted to an assumed depth of 12 inches bgs. Removed soil would be transported offsite and placed within the former Libby vermiculite mine. Removal areas are assumed to be backfilled using clean soil. Clean soil used to backfill removal areas would be transported from an offsite borrow source outside of the Libby valley tested for contamination. These assumptions would be refined at the time of remedial design.

Institutional and engineered controls as well as monitoring would be performed similarly as discussed above for Alternative 3b.

The protectiveness of this alternative would be maintained by conducting each of the following on a periodic basis:

- Long-term O&M would be performed to maintain the integrity of the engineered controls, protective covers, and backfilled excavations. As part of the O&M, institutional controls would be evaluated and updated if necessary to ensure protectiveness.

- Monitoring (consisting of inspections such as those discussed previously in Section 2.5) would be performed to ensure that the integrity of the remedy components (protective covers and backfilled excavations) placed at the site are intact and that protection of human health is maintained within the site.

- Five-year site reviews would be performed since contaminated subsurface soil is left in place below the protective covers and backfilled excavations, preventing unrestricted use of the site.

5.3.6 Alternative 5: Removal of Contaminated Soil within the Flyway Subarea, Offsite Thermo-Chemical Treatment and Reuse of Treated Material, Institutional and Engineered Controls with Monitoring

Alternative 5 provides protection of human health primarily through removal (excavation) and treatment of the removed contaminated soil at an offsite facility that demineralizes asbestos fibers using thermo-chemical conversion to address risks to human receptors from the contaminated surface soil within two isolated locations of the Flyway subarea. These two locations include the west embankment of Highway 37 and the area surrounding sample location 1-03000. Institutional controls coupled with engineered controls as described for Alternative 4 would also be implemented to restrict access and use of areas containing residual contaminated soil remaining after the interim and final remedial actions, including the seasonally flooded areas located within the Flyway Subarea where presence or absence of LA contamination is unknown. .

Removal of soil would be conducted to an assumed depth of 12 inches bgs. Removed soil would be transported to a permitted offsite treatment facility to undergo thermo-chemical conversion. TCCT, patented by ARI, is a commercial form of this technology. Contaminated soil would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. The resulting reaction product (rock-like material) is an inert material that is not fibrous like asbestos. Testing of the reaction product would be performed before removal from the treatment facility to ensure that it no longer poses risks to human health. Although studies have been performed by ARI to support this assertion (ARI 2007), the technology is relatively new so extensive sets of data are not available to demonstrate long-term irreversibility of the treatment process.

The treated inert material would then be transported back to the site and used as backfill material for the removal areas on the site. Clean soil from an offsite borrow source outside of the Libby valley tested for contamination would be used to supplement inert backfill material derived from the treatment process. These assumptions would be refined at the time of remedial design.

Institutional and engineered controls and monitoring would be performed similarly as discussed above for Alternative 4.

The protectiveness of this alternative would be maintained by conducting each of the following on a periodic basis:

- Long-term O&M would be performed to maintain the integrity of the engineered controls, protective covers, and backfilled excavations. As part of O&M, institutional controls would be evaluated and updated if necessary to ensure protectiveness.
- Monitoring (consisting of inspections such as those discussed previously in Section 2.5) would be performed to ensure that the integrity of the remedy components (protective covers and backfilled excavations) at the site are intact and that protection of human health is maintained within the site.

- Five-year site reviews would be performed since contaminated subsurface soil is left in place below the protective covers and backfilled excavations, preventing unrestricted use of the site.

5.4 Screening Evaluation of Alternatives

5.4.1 Screening Criteria

The purpose of this screening evaluation is to reduce the number of proposed remedial alternatives that undergo a more thorough and extensive analysis as presented in Section 7. These alternatives are qualitatively evaluated using a smaller set of screening evaluation criteria than what is used for detailed evaluation of retained alternatives after screening. Each of these proposed alternatives is screened using the short- and long-term aspects (where applicable) of three broad criteria: effectiveness, implementability, and cost.

5.4.1.1 Effectiveness

Effectiveness relates to the ability of the remedial alternative to satisfy screening evaluation criteria detailed in Exhibit 5-2.

Exhibit 5-2. Effectiveness Criteria

Effectiveness Criteria
Overall protection of human health and the environment[1]
Compliance with ARARs[1]
Short-term effectiveness (during the remedial construction and implementation period)
Long-term effectiveness and permanence (following remedial construction)
Reduction of toxicity, mobility, or volume through treatment

[1] These criteria are referred to as "threshold criteria" that an alternative must meet to be viable (except the "no action" alternative); threshold criteria are described further in Section 6.0.

Effectiveness of each of the proposed alternatives is judged against the five effectiveness screening criteria using the qualitative ratings system in Exhibit 5-3.

Exhibit 5-3. Effectiveness Qualitative Ratings System

Effectiveness Ratings Categories	
⓿	None
❶	Low
❷	Low to moderate
❸	Moderate
❹	Moderate to high
❺	High

5.4.1.2 Implementability

Implementability relates to the ability of the remedial alternative to satisfy screening evaluation criteria detailed in Exhibit 5-4.

Exhibit 5-4. Implementability Criteria

Implementability Criteria	
Technical feasibility	Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete
	Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete
Administrative feasibility	Ability to obtain approvals from other agencies
	Availability and capacity of treatment, storage, and disposal services
	Availability of property, specific materials and equipment, and technical specialists required for a remedial action

Implementability of each of the proposed alternatives is judged against the screening criteria using the qualitative ratings system presented in Exhibit 5-5.

Exhibit 5-5. Implementability Qualitative Ratings System

Implementability Ratings Categories	
⓿	None
❶	Low
❷	Low to moderate
❸	Moderate
❹	Moderate to high
❺	High

Determination that an alternative is not technically feasible will usually preclude it from further consideration. Negative factors affecting administrative feasibility will normally involve coordination steps to lessen the negative aspects of the alternative but will not necessarily eliminate an alternative from consideration.

5.4.1.3 Cost

Cost estimates prepared for screening alternatives are typically comparative estimates with relative accuracy so that cost decisions among alternatives are sustained as the accuracy of cost estimates improve in the detailed analysis of alternatives. The procedures used to develop cost estimates for alternative screening are similar to those used for detailed analysis; the differences are in the degree of alternative refinement and cost component development.

The focus of comparative screening estimates is to identify and include items that are essential to the alternatives that control the magnitude of the overall cost. Cost estimates at this step of the FS process are generally determined using cost curves, generic unit costs, vendor information, conventional cost-estimating guides, and prior similar estimates modified by site-specific information rather than detailed cost estimates. Both capital and O&M costs are considered in these estimates. Present value analyses are performed to discount all costs to a common base year. This is performed to fairly evaluate expenditures occurring over different time frames.

Because uncertainties with the definition of alternatives may remain in this step of the FS process, the costs developed for the screening analysis of these proposed alternatives are not held to the accuracy required for the detailed analysis of alternatives (i.e. +50 percent to -30 percent of actual costs). Typical cost accuracy ranges for alternative screening are +100 percent to -50 percent of actual costs.

There are specific GRAs that are essential components for each alternative that control the magnitude of costs for screening-level estimates. These specific GRAs for each alternative are listed below:

Alternative 1:	Monitoring
Alternative 2:	Monitoring, Institutional Controls, and Engineered Controls
Alternative 3a:	Monitoring, Institutional Controls, Engineered Controls, and Containment
Alternative 3b:	Monitoring, Institutional Controls, Engineered Controls, Containment, Removal, Transport, and Disposal
Alternative 4:	Monitoring, Institutional Controls, Engineered Controls, Removal, Transport, and Disposal
Alternative 5:	Monitoring, Institutional Controls, Engineered Controls, Removal, Transport, and Treatment

It should be noted that only GRA components that are fundamental cost drivers for the alternative in question were included in the screening-level cost estimates. The specific process options included within each GRA to address contaminated soil are identified on Table 5-1 and include tasks that are not specifically mentioned in the GRA. For instance, the GRA of "Transport" directly addresses the contaminated medium (soil), while transport of backfill required to construct covers is inherent to the process options that comprise the GRA of "Containment". Thus, the GRA of "Transport" is not mentioned separately for alternatives that strictly involve containment. Overall unit quantities (areas and volumes) required to develop costs for these items are presented in Appendix B.

The cost of each proposed alternative is rated on a comparative basis with other alternatives using a scale determined from the range of costs for the screened alternatives. Due to the likely alternative costs for the site, the cost ranges for the ratings categories are rather large. The cost rating categories are as follows in Exhibit 5-6:

Exhibit 5-6. Cost Qualitative Ratings System

Cost Ratings Categories		Cost Ranges (Present Value Dollars)
$	**Low**	Less than 250 thousand dollars
$$	**Low to moderate**	Between 250 thousand and 500 thousand dollars
$$$	**Moderate**	Between 500 thousand and 1 million dollars
$$$$	**Moderate to high**	Between 1 million and 1.5 million dollars
$$$$$	**High**	Greater than 1.5 million dollars

The evaluation and screening of each alternative using the three screening criteria are presented in Appendix C. This evaluation and screening process is inherently qualitative in nature (with the exception of approximate cost). The evaluation criteria described in Section 5.4 are specified by EPA guidance; however the degree to which the criteria are weighted against each other are not specified. Determination of how the individual evaluation criterion influences the overall rankings is somewhat subjective and based on site-specific considerations.

Generally alternatives with similar scope and essential components would have overall rankings that are similar, unless other considerations such as large differences in waste volumes or differing construction durations exist between them. Factors that affect the threshold criteria (overall protection of human health and the environment and compliance with ARARs) are given considerable weight in the overall ranking for effectiveness since alternatives must fully meet these criteria to be viable as a selected remedy. The threshold criteria are described in further detail within Section 6.

5.5 Summary of Alternatives Screening

Each alternative developed and described in Section 5.3 was evaluated to determine its overall effectiveness, implementability, and cost in Appendix C using the qualitative ratings system discussed in Section 5.4. Exhibit 5-7 summarizes the results for the screening of alternatives for the site.

Remedial alternatives deemed to have lower than moderate effectiveness, lower than moderate implementability, and/or high cost are eliminated from further consideration. The alternatives eliminated from further consideration in this FS are Alternatives 4 and 5 as indicated in Exhibit 5-7 using grey shading. The remaining alternatives are retained for detailed analysis as discussed in Section 5.6.

Exhibit 5-7. Summary of Alternatives Screening

Alternative	Description	Effectiveness	Implementability	Approx. Cost (Present Value Dollars)	
1	No Action	⓿	❺	$	$110,000
2	Institutional and Engineered Controls with Monitoring	❸	❸	$$$	$640,000
3a	In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring	❸	❸	$$$	$700,000
3b	In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring	❸	❸	$$$	$720,000
4	Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring	❸	❷	$$$	$710,000
5	Removal of Contaminated Soil within the Flyway Subarea, Offsite Thermo-Chemical Treatment and Reuse of Treated Material, Institutional and Engineered Controls with Monitoring	❸	❶	$$$$	$1,310,000

Notes:

1. The alternatives screening process involves a qualitative assessment of the degree to which remedial alternatives address evaluation criteria presented in Appendix C. The numerical designations for the qualitative ratings system used in this table are not used to quantitatively assess remedial alternatives (for instance, rankings for an alternative are not additive).
2. Shading indicates alternative has been eliminated from further consideration based on lack of effectiveness, lack of implementability, and/or elevated costs. Remaining (unshaded) remedial alternatives have been retained for detailed analysis in Section 7.0.
3. Screening cost spreadsheets (screening cost estimate summaries and present value analyses) for each alternative are presented in Appendix D.

<u>Legend for Qualitative Ratings System:</u>

Effectiveness and Implementability		Cost (Present Value Dollars)	
⓿	**None**	⓿	**None ($0)**
❶	**Low**	$	**Low ($0 through $250K)**
❷	**Low to Moderate**	$$	**Low to Moderate ($250K through $500K)**
❸	**Moderate**	$$$	**Moderate ($500K through $1M)**
❹	**Moderate to High**	$$$$	**Moderate to High ($1M through $1.5M)**
❺	**High**	$$$$$	**High (Greater than $1.5M)**

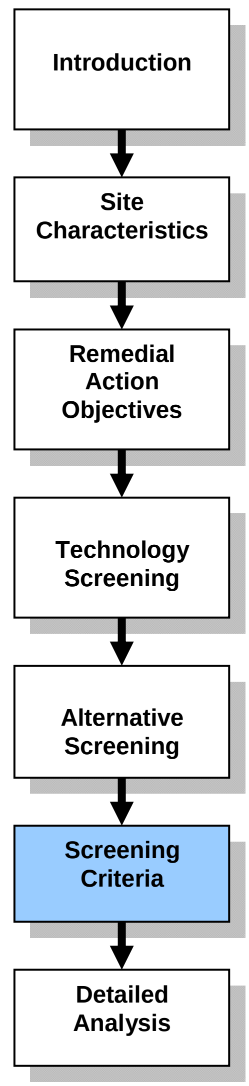
5.6 Alternatives Retained for Detailed Analysis

Based on the screening of the alternatives in Section 5.5, the following alternatives were retained for detailed analysis as presented in Section 7.

- Alternative 1: No Action
- Alternative 2: Institutional and Engineered Controls with Monitoring
- Alternative 3a: In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring
- Alternative 3b: In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Section 6
Definition of Criteria Used in the Detailed Analysis of Retained Alternatives

The remedial alternatives retained after completion of the preliminary alternative screening step of the FS process (summarized in Section 5) are evaluated using nine evaluation criteria. These criteria were developed to address statutory requirements and considerations for remedial actions in accordance with the NCP and additional technical and policy considerations that have proven to be important for selecting among remedial alternatives (EPA 1988). The following subsections describe the nine evaluation criteria used in the detailed analysis of remedial alternatives and the priority in which the criteria are considered.



6.1 Overall Protection of Human Health and the Environment

Each alternative is assessed to determine whether it can provide adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site. Evaluation of this criterion focuses on how site risks are eliminated, reduced, or controlled through treatment, engineered controls, or institutional controls and whether an alternative poses any unacceptable cross-media impacts.

Criteria Used to Evaluate Remediation Alternatives Address Multiple Areas

- Protection of Human Health and Environment
- Compliance with ARARs
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

6.2 Compliance with ARARs

For this criterion, we evaluate each alternative to determine how chemical-, location-, and action-specific ARARs identified in Appendix A of this document will be met.

If the assessment indicates an ARAR will not be met, then the basis for justifying one of the six ARAR waivers allowed under CERCLA is discussed. These ARAR waivers are detailed in Exhibit 6-1.

Exhibit 6-1. ARAR Waivers

Waiver	Description
Interim Measures	The remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed. (CERCLA §121(d)(4)(A).)
Greater Risk to Health and the Environment	Compliance with such requirement at the facility will result in greater risk to human health and the environment than alternative options. (CERCLA §121(d)(4)(B).)
Technical Impracticability	Compliance with such requirement is technically impracticable from an engineering perspective. (CERCLA §121(d)(4)(C).)
Equivalent Standard of Performance	The remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation through use of another method or approach. (CERCLA §121(d)(4)(D).)
Inconsistent Application of State Requirements	With respect to a state standard, requirement, criteria, or limitation, the state has not consistently applied (or demonstrated the intention to consistently apply) the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions. (CERCLA §121(d)(4)(E).)
Fund Balancing	In the case of a remedial action to be undertaken solely under section 104 using the fund, selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health and welfare and the environment at the facility under consideration and the availability of amounts from the fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the relative immediacy of such threats. (CERCLA §121(d)(4)(F).)

6.3 Long-Term Effectiveness and Permanence

Long-term effectiveness evaluates the likelihood that the remedy will be successful and the permanence that it affords. Factors to be considered, as appropriate, include the following:

- Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities. The characteristics of the residuals are considered to the degree that they remain hazardous, taking into account their toxicity, mobility, or volume and propensity to bioaccumulate.

- Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site. This factor includes an assessment of containment systems and institutional controls to determine if they are sufficient to ensure that any exposure to human and ecological receptors is within protective levels. This factor also addresses the long-term reliability of management controls for providing continued protection from residuals, the assessment of the potential need to replace technical components of the alternative, and the potential exposure pathways and risks posed should the remedial action need replacement.

6.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

Each alternative is assessed for the degree to which it employs technology to permanently and significantly reduce toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site. Factors to be considered, as appropriate, include the following:

- The treatment processes the alternatives use and materials they will treat
- The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed
- The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment
- The degree to which the treatment is irreversible
- The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents
- Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action

6.5 Short-Term Effectiveness

This criterion reviews the effects of each alternative during the construction and implementation phase of the remedial action until remedial response objectives are met. The short-term impacts of each alternative are assessed, considering the following factors, as appropriate:

- Short-term risks that might be posed to the community during implementation of an alternative
- Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures
- Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts
- Time until protection is achieved

6.6 Implementability

The technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation is evaluated under this criterion. The ease or difficulty of implementing each alternative will be assessed by considering the following factors, as appropriate:

- Technical feasibility will be assessed based on the following factors; technical difficulties and unknowns (associated with the construction and operation of a technology); reliability of the technology (focusing on technical problems that will lead to schedule delays); ease of undertaking additional remedial actions (including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions); and ability to monitor the effectiveness of the remedy (including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure).

- Administrative feasibility includes activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions).

- Availability of services and materials will be assessed based on the following factors; availability of adequate services for offsite treatment, storage capacity, and disposal capacity; availability of necessary equipment and specialists (includes provisions to ensure any necessary additional resources); availability of services and materials (includes the potential for obtaining competitive bids, which is particularly important for innovative technologies); and availability of prospective technologies

6.7 Cost

Types of costs that are assessed for each alternative include the following:

- Capital costs

- Annual O&M costs

- Periodic costs

- Present value of capital and annual O&M costs

Cost estimates are developed according to *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000a). Flexibility is incorporated into each alternative for the location of remedial facilities, the selection of cleanup levels, and the period in which remedial action will be completed. Assumptions of the project scope and duration are defined for each alternative to provide cost estimates for the various remedial alternatives. Important assumptions specific to each alternative are summarized in the description of the alternative. Additional assumptions are included in the detailed cost estimates in Appendix G.

The levels of detail employed in making these estimates are conceptual but are considered appropriate for making choices between alternatives. The information provided in the cost estimate is based on the best available information regarding the anticipated scope of the remedial alternatives.

The costs are evaluated with respect to the following categories:

- Capital costs are those expenditures that are required to construct a remedial action. They are exclusive of costs required to operate or maintain the action throughout its lifetime. Capital costs consist primarily of expenditures initially incurred to build or install the remedial action (e.g., construction of a water treatment system and related site work). Capital costs include all labor, equipment, and material costs (including contractor markups, such as overhead and profit) associated with activities, such as mobilization/demobilization; monitoring site work; installation of extraction, containment, or treatment systems; and disposal. Capital costs also include expenditures for professional/technical services that are necessary to support construction of the remedial action.

- Annual O&M costs are those post-construction costs necessary to ensure or verify the continued effectiveness of a remedial action. These costs are estimated mostly on an annual basis. Annual O&M costs include all labor, equipment, and material costs (including contractor markups, such as overhead and profit) associated with activities, such as monitoring; operating and maintaining extraction, containment, or treatment systems; and disposal. Annual O&M costs also include expenditures for professional/technical services necessary to support O&M activities.

- Periodic costs are those costs that occur only once every few years (e.g., 5-year reviews, equipment replacement) or expenditures that occur only once during the entire O&M period or remedial time frame (e.g., site closeout, remedy failure/replacement). These costs may be either capital or O&M costs but, because of their periodic nature, it is more practical to consider them separately from other capital or O&M costs in the estimating process.

- The present value of each alternative provides the basis for the cost comparison. The present value cost represents the amount of money that, if invested in the initial year of the remedial action at a given rate, would provide the funds required to make future payments to cover all costs associated with the remedial action over its planned life. Future O&M and periodic costs are included and reduced by the appropriate present value discount rate as outlined in *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study (EPA 2000a)*. Per the guidance, the present value analysis was performed on remedial alternatives using a 7 percent discount (interest) rate over the period of evaluation for each alternative. Inflation and depreciation, per guidance, were not considered in preparing the present value costs.

6.8 State Acceptance

This criterion evaluates the technical and administrative issues and concerns the state may have regarding each of the alternatives. Assessment of state concerns will be completed after comments on the FS and proposed plan have been received by EPA and are addressed in the ROD. Thus, state acceptance is not considered in the detailed evaluation of alternatives presented in this FS.

6.9 Community Acceptance

Assessment of concerns from the public will be completed after comments on the FS and proposed plan have been received by EPA and are addressed in the ROD. Thus, community acceptance is not considered in the detailed evaluation of alternatives presented in this FS.

6.10 Criteria Priorities

The nine evaluation criteria are separated into three groups to establish priority among these criteria during detailed evaluation of the remedial alternatives as detailed in Exhibit 6-2.

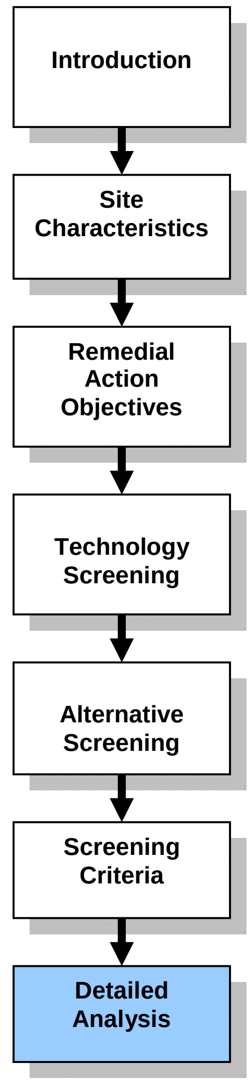
Exhibit 6-2. Criteria Priorities

Group	Criteria	Definition
Threshold Criteria	Overall Protection of Human Health and the Environment Compliance with ARARs	Must be satisfied by the remedial alternative being considered as the preferred remedy
Balancing Criteria	Long-Term Effectiveness and Permanence Reduction of Toxicity, Mobility, or Volume through Treatment Short-Term Effectiveness Implementability Cost	Technical criteria evaluated among those alternatives satisfying the threshold criteria
Modifying Criteria	State Acceptance and Community Acceptance	Not evaluated in this FS; evaluated after comments received on the FS and proposed plan

Section 7
Detailed Analysis of Retained Alternatives

7.1 Overview

In this section, remedial alternatives retained in Section 5 undergo detailed analysis. During detailed analysis, each alternative is assessed using the two threshold criteria and five balancing criteria presented in Section 6. The results of the detailed analysis for each remedial alterative are then arrayed to perform a comparative analysis of the alternatives and identify the key tradeoffs between them.



The following alternatives were retained for detailed analysis in Section 7:

Alternative 1: No Action

Alternative 2: Institutional and Engineered Controls with Monitoring

Alternative 3a: In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

Alternative 3b: In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

7.2 Secondary Assumptions Affecting Detailed Analysis of Remedial Alternatives

Fundamental assumptions for all remedial alternatives used during alternative development and screening were presented in Section 5. In addition, there are numerous secondary assumptions that affect the detailed analysis of alternatives; however, they are not critical to detailed evaluation of remedial alternatives. These assumptions are driven mainly by site limitations and constraints that cannot be overcome by using one or more retained remedial technology/process options as described in Section 4. Some of these secondary assumptions are grouped into distinct categories and include the items listed in Exhibit 7-1.

Exhibit 7-1. Secondary Assumptions Affecting Refinement and Detailed Analysis of Remedial Alternatives

Secondary Assumption Category	Secondary Assumption Description	Rationale
Containment (Protective Cover) Assumptions	Type and Thickness of Covers For In-Place Containment	As discussed in Exhibit 5-1, the type of cover is assumed to be predominantly soil since soil covers are easily installed, borrow soil resources are available, and borrow soil is relatively inexpensive compared to other types of cover materials, such as geosynthetic materials or concrete/asphalt. Options other than soil covers will be considered during remedial design. The thickness of the representative soil covers for in-place containment is assumed for FS purposes to be 18 inches (12 inches of subsoil and 6 inches of topsoil). The assumed materials and thicknesses will be refined, if necessary, during the remedial design process.
Removal Assumptions	Assumed Depth of Excavation and Backfill	As discussed in Exhibit 5-1, the minimum depth of initial excavation for removal at the site is assumed to be 12 inches bgs. It is also assumed that no additional iterative excavation would be required after confirmatory sampling. Excavation backfill depths are assumed to be 12 inches (6 inches of subsoil and 6 inches of topsoil for soil backfill). This assumption will be refined, if necessary, during the remedial design process.
Land Use Assumptions	Protectiveness and Permanence of Cover and Excavation Backfill	It is assumed that the protective soil cover (for Alternatives 3a and 3b) and excavation backfill (for Alternative 3b) would be used for low intensity traffic (foot traffic or consisting of pedestrians). If high intensity traffic (vehicles consisting of motorized and non-motorized bikes, trucks and boat trailers, cars, etc.) is allowed based on the future land uses, then use of hardscaped surfaces (like gravel, concrete or asphalt) may be needed to ensure protectiveness and permanence. For the purpose of this FS evaluation, locations where cover placement or removal is performed would be hydroseeded to ensure the permanence of the covers or backfill over contaminated subsurface soils.
Engineered Controls	Fencing with Signage	Engineered controls would be placed to exclude access to seasonally flooded areas located within the Flyway Subarea, where presence or absence of LA contamination is unknown (Figures 7-1 and 7-2). Engineered controls would consist of fencing (assumed to be chain link) along with warning signs. Warning signs would be installed at all entrances and at intervals of 100 meters along the fence perimeter.
Borrow Material Assumptions	Uncontaminated Subsoil and Topsoil Borrow from Offsite Sources	Alternative 3a and 3b would require the use of uncontaminated soil for construction of protective covers and/or for backfilling excavated areas. Onsite materials are not assumed because most of the site has the potential to be contaminated with LA and/or vermiculite. It is assumed that offsite subsoil borrow sources outside of the Libby valley used for the ongoing Libby cleanup efforts would also be used for the OU2 site remediation.
	Organic Amendments for Topsoil from Offsite Sources	Alternative 3a and 3b would require the use of uncontaminated topsoil for construction of covers and for backfilling excavated areas. It is assumed that topsoil would be manufactured from the clean borrow soil brought from offsite subsoil borrow sources outside the Libby valley using organic amendments derived from composting facilities.

Exhibit 7-1. Secondary Assumptions Affecting Refinement and Detailed Analysis of Remedial Alternatives (continued)

Secondary Assumption Category	Secondary Assumption Description	Rationale
Dust Suppression Assumptions	Water-Based Dust Suppression	Dust suppression measures would be implemented under all alternatives (except the "no action" alternative required by the NCP). Water is assumed to be used as the primary option for dust suppression to provide protection of human health and meet ARARs (i.e. keeping contaminated soil 'adequately wet'). It is also assumed the water for dust suppression would be obtained from the pumphouse at OU2.
Offsite Disposal Assumptions	Assumptions for Use of Former Libby Vermiculite Mine	Alternative 3b assumes offsite disposal of contaminated soil at the Former Libby Vermiculite Mine. This mine is currently being used for disposal of contaminated soil generated during ongoing cleanup activities performed for other operable units within the Libby Asbestos Site.

Note: The list of secondary assumptions provided is a summary and is not all-inclusive; additional secondary assumptions are contained in Appendices B, E, and G.

7.3 Alternative 1: No Action

7.3.1 Remedial Alternative Component Descriptions

Alternative 1 is required by the NCP to provide an environmental baseline against which impacts of the various remedial alternatives can be compared. A summary of the remedial components of Alternative 1 is provided in Section 5.3.1. The following text provides additional detail about the remedial components of this alternative.

Alternative 1 would discontinue all current remedial activities, and no further action would be initiated at the site to address contaminated soil or otherwise mitigate the associated risks to human health or the environment.

The only actions that would be implemented for Alternative 1 are completion of 5-year site reviews as required by the NCP and monitoring (specifically non-intrusive visual inspections) required to support conclusions made in the 5-year site reviews. Non-intrusive visual inspections (i.e. surface inspections) performed in support of 5-year site reviews would be made on the entire area within the OU2 site boundary. Generalized descriptions of inspection and sampling methods are provided in Section 2.5, and details concerning the proposed monitoring protocol for Alternative 1 are provided in Appendix E.

7.3.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 1 is provided in Table F-1 using the evaluation criteria along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is none. ⓿

7.3.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 1 is provided in Table F-2 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix A. The overall rating on this criterion for Alternative 1 is none. ⓿

7.3.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 1 is provided in Table F-3 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is none. ⓿

7.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 1 is provided in Table F-4 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is none. ⓿

7.3.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 1 is provided in Table F-5 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is none. ⓿

7.3.7 Implementability

Evaluation of implementability for Alternative 1 is provided in Table F-6 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is high. ❺

7.3.8 Cost

Evaluation of cost for Alternative 1 is provided in Table F-7 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix G. The overall rating on this criterion for Alternative 1 is low. $

7.4 Alternative 2: Institutional and Engineered Controls with Monitoring

7.4.1 Remedial Alternative Component Descriptions

Alternative 2 provides protection of human health through institutional controls (legal and administrative controls) coupled with engineered controls (physical controls such as fencing and signage) to restrict access and use of areas containing contaminated soil, rather than active cleanup of the site. Monitoring would be used to ensure that these controls are protective of human health.

A description of the remedial components of Alternative 2 is provided in Section 5.3.2. The conceptual remedial configuration is presented in Figure 7-1. The following text provides additional detail about the remedial components of this alternative.

Engineered controls would be placed to exclude access to the seasonally flooded areas located within the Flyway Subarea where presence or absence of LA contamination is unknown. It is assumed for FS purposes that engineered controls would consist of chain link fencing along with warning signs. Warning signs would be installed at all entrances and at intervals of 100 meters along the fence perimeter. As shown on Figure 7-1, approximately 3,330 linear feet of fencing along with 11 warning signs would be required to exclude access to the seasonally flooded areas. Water- or chemical-based suppression would be used during construction of engineered controls to prevent asbestos fibers from the contaminated soil from becoming airborne and potentially posing an inhalation exposure risk. Long-term O&M would be required to maintain the integrity of the engineered controls and covers placed during the interim remedial action.

Institutional controls would be employed to ensure that the entire site is maintained and protected and provide access for future monitoring. It would also provide a means of notification if additional future residential and/or commercial development is proposed at the Site. Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices. In general, it is anticipated that implementing and enforcing institutional controls could potentially be challenging for the site since portions of OU2 are currently under private ownership. Issuance and periodic review and update of a comprehensive institutional control plan likely would be required to keep track of the various institutional control measures taken for the site.

Monitoring (consisting of inspections) would be performed routinely to ensure that protection of human health is maintained at the site. Monitoring protocol would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers placed during interim remedial actions; these inspections are assumed to be performed annually as well as concurrently with 5-year site reviews. Generalized descriptions of inspection methods are provided in Section 2.5, and specific details concerning the monitoring protocol for Alternative 2 (including proposed types, and frequencies) are provided in Appendix E.

The community would be kept informed during implementation of the remedial action and during 5-year site reviews. Five-year site reviews would be performed for the site as described for Alternative 1 since contaminated soil is potentially left in place (below covers) preventing unrestricted use of the site.

Exhibit 7-2 provides a summary of the major remedial components for Alternative 2 requiring construction and the estimated quantities for these components.

Exhibit 7-2. Summary of Major Remedial Components and Associated Quantities for Alternative 2

Remedial Component	Unit	Estimated Quantity
Total Length of Fence	**Feet**	3,330
Total Number of Warning Signage	**Each**	11

Note: Quantities summarized in this exhibit are contained in Appendices B and G. Although detailed quantities have been provided, they should be considered approximate for FS evaluation purposes only.

7.4.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 2 is provided in Table F-8 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 2 is moderate. ❸

7.4.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 2 is provided in Table F-9 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix A. The overall rating on this criterion for Alternative 2 is moderate to high. ❹

7.4.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 2 is provided in Table F-10 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 2 is moderate. ❸

7.4.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 2 is provided in Table F-11 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 2 is none. ⓿

7.4.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 2 is provided in Table F-12 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 2 is moderate. ❸

7.4.7 Implementability

Evaluation of implementability for Alternative 2 is provided in Table F-13 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 2 is moderate. ❸

7.4.8 Cost

Evaluation of cost for Alternative 2 is provided in Table F-14 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix G. The overall rating on this criterion for Alternative 2 (present value cost) is moderate. $$$

7.5 Alternative 3a: In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

7.5.1 Remedial Alternative Component Descriptions

Alternative 3a provides protection of human health through in-place containment (protective covers) to address risks to human receptors from contaminated soil within two isolated locations of the Flyway subarea. These two locations include the west embankment of Highway 37 and the area surrounding sample location 1-03000. Institutional controls coupled with engineered controls as described for Alternative 2 would also be implemented to restrict access and use of areas containing residual contaminated soil remaining after the interim and final remedial actions, including the seasonally flooded areas located within the Flyway Subarea where presence or absence of LA contamination is unknown.

Monitoring would be used to ensure that these controls are protective of human health.

A description of the remedial components of Alternative 3a is provided in Section 5.3.3. The conceptual remedial configuration is presented in Figure 7-2. The following text provides additional detail about the remedial components of this alternative.

Based on the assumption of low intensity (non-motorized) traffic, contaminated surface soil within two isolated areas located on the west embankment of Highway 37and the area surrounding sample 1-03000 within the south-central portion of the Flyway subarea would be contained in-place using protective soil covers.. The protective soil covers are assumed to be 18 inches thick, with 12 inches of clean soil cover and 6 inches of topsoil. Clean soil for the covers would be brought from an offsite borrow source area outside of Libby valley and would be analyzed for asbestos before use during construction. Water- or chemical-based suppression would be used during construction of the covers and engineered controls to prevent asbestos fibers from the contaminated soil from becoming airborne and potentially posing an inhalation exposure risk.

A visibly distinct marker layer (such as orange construction fencing) would be placed at the bottom of the cover to denote the extent of the covers constructed as part of this remedy. The entire extent of the protective soil covers would be hydroseeded to minimize erosion and to help maintain the integrity and permanence of the covers.

Long-term O&M would be required to maintain the integrity of the engineered controls and covers, including covers placed during the interim remedial action and as part of this alternative.

Engineered and institutional controls would be implemented for the site as described under Alternative 2.

Monitoring (consisting of inspections) would be performed routinely to ensure that protection of human health is maintained at the site. Monitoring protocol would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers (including covers placed during the interim remedial action); these are assumed to be performed annually as well as concurrently with 5-year site reviews. Generalized descriptions of inspection methods are provided in Section 2.5, and specific details concerning the monitoring protocol for Alternative 3a (including proposed types, and frequencies) are provided in Appendix E.

The community would be kept informed during implementation of the remedial action and during 5-year site reviews. Five-year site reviews would be performed for the site as described for Alternative 1 since contaminated soil is potentially left in place (below covers), preventing unrestricted use of the site.

Exhibit 7-3 provides a summary of the major remedial components for Alternative 3a requiring construction and the estimated quantities for these components.

Exhibit 7-3. Summary of Major Remedial Components and Associated Quantities for Alternative 3a

Remedial Component	Unit	Estimated Quantity
Surface Area of Containment (Covers)	**Square Feet**	15,000
Common Backfill Required to Construct Covers	**Loose Cubic Yards**	640
Topsoil Required to Construct Covers	**Loose Cubic Yards**	320
Total Length of Fence	**Feet**	3,330
Total Number of Warning Signage	**Each**	11

Note: Quantities summarized in this exhibit are contained in Appendices B and G. Although detailed quantities have been provided, they should be considered approximate for FS evaluation purposes only.

7.5.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 3a is provided in Table F-15 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3a is moderate. ❸

7.5.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 3a is provided in Table F-16 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix A. The overall rating on this criterion for Alternative 3a is moderate to high. ❹

7.5.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 3a is provided in Table F-17 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3a is moderate to high. ❹

7.5.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 3a is provided in Table F-18 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3a is none. ⓿

7.5.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 3a is provided in Table F-19 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3a is moderate. ❸

7.5.7 Implementability

Evaluation of implementability for Alternative 3a is provided in Table F-20 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3a is moderate. ❸

7.5.8 Cost

Evaluation of cost for Alternative 3a is provided in Table F-21 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix G. The overall rating on this criterion for Alternative 3a (present value cost) is moderate. $$$

7.6 Alternative 3b: In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

7.6.1 Remedial Alternative Component Descriptions

Alternative 3b provides protection of human health primarily through in-place containment (protective covers) as well as removal and offsite disposal to address risks to human receptors from contaminated soil within two isolated locations of the Flyway subarea. These two locations include the west embankment of Highway 37 and the area surrounding sample location 1-03000. The location within the west embankment of Highway 37 would be contained in-place using protective covers and the location surrounding sample location 1-03000 would be excavated along with offsite disposal of contaminated soil.

Institutional controls coupled with engineered controls as described for Alternative 2 would also be implemented to restrict access and use of areas containing residual contaminated soil remaining after the interim and final remedial actions, including the seasonally flooded areas located within the Flyway Subarea where presence or absence of LA contamination is unknown. Monitoring would be used to ensure that these controls are protective of human health.

A description of the remedial components of Alternative 3b is provided in Section 5.3.4. The conceptual remedial configuration is presented in Figure 7-3. The following text provides additional detail about the remedial components of this alternative.

Based on the assumption of low intensity (non-motorized) traffic, contaminated surface soil within two isolated areas located on the west embankment of Highway 37 within the Flyway subarea would be contained in-place using protective soil covers. The protective soil covers are assumed to be 18 inches thick, with 12 inches of clean soil cover and 6 inches of topsoil.

Limited removal (excavation) of contaminated soil within the area surrounding sample 1-03000 would be conducted to an assumed depth of 12 inches bgs, andthen backfilled using clean soil. Specialized trucks (with covered tops) would be used to transport removed contaminated soil to the Former Libby Vermiculite Mine. This mine is been currently used for disposal of contaminated soil generated during ongoing cleanup activities performed in other OUs within the Libby Asbestos Superfund Site. Water- or chemical-based suppression would be implemented during removal and used during construction of the covers and engineered controls to prevent asbestos fibers from the contaminated soil from becoming airborne and potentially posing an inhalation exposure risk.

Clean soil for covers and for backfilling excavated areas would be brought from an offsite borrow source area outside of Libby valley and would be analyzed for asbestos before use during construction. A visibly distinct marker layer (such as orange construction fencing) would be placed at the bottom of the covers and excavations to denote the extent of the covers backfill placed as part of this remedy. The entire extent of disturbed area would be hydroseeded to minimize erosion and to help maintain the integrity and permanence of the covers and backfilled areas. Long-term O&M would be required to maintain the integrity of the engineered controls and covers, including covers placed during the interim remedial action and as part of this alternative.

Engineered and institutional controls would be implemented for the site as described under Alternative 3a.Monitoring (consisting of inspections) would be performed routinely to ensure that protection of human health is maintained at the site. Monitoring protocol would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers and backfilled areas (including covers placed during the interim remedial action); these are assumed to be performed annually as well as concurrently with 5-year site reviews. Generalized descriptions of inspection methods are provided in Section 2.5, and specific details concerning the monitoring protocol for Alternative 3b (including proposed types, and frequencies) are provided in Appendix E.

The community would be kept informed during implementation of the remedial action and during 5-year site reviews. Five-year site reviews would be performed for the site as described for Alternative 1 since contaminated soil is potentially left in place (below covers and clean backfill), preventing unrestricted use of the site.

Exhibit 7-4 provides a summary of the major remedial components for Alternative 3b requiring construction and the estimated quantities for these components.

Exhibit 7-4. Summary of Major Remedial Components and Associated Quantities for Alternative 3b

Remedial Component	Unit	Estimated Quantity
Surface Area of Containment (Highway 37 Embankment Covers)	**Square Feet**	5,000
Surface Area of Removal (Area Surrounding Sample Location 1-03000)	**Square Feet**	10,000
Volume of Contaminated Soil Removed	**Loose Cubic Yards**	430
One-Way Distance to the Mine	**Miles**	8
Common Backfill Required (Covers and Excavated Areas)	**Loose Cubic Yards**	430
Topsoil Required (Covers and Excavated Areas)	**Loose Cubic Yards**	320
Total Length of Fence	**Feet**	3,330
Total Number of Warning Signage	**Each**	11

Note: Quantities summarized in this exhibit are contained in Appendices B and G. Although detailed quantities have been provided, they should be considered approximate for FS evaluation purposes only.

7.6.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 3b is provided in Table F-22 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3b is moderate. ❸

7.6.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 3b is provided in Table F-23 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix A. The overall rating on this criterion for Alternative 3b is moderate to high. ❹

7.6.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 3b is provided in Table F-24 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3b is moderate to high. ❹

7.6.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 3b is provided in Table F-25 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3b is none. ⓿

7.6.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 3b is provided in Table F-26 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3b is moderate. ❸

7.6.7 Implementability

Evaluation of implementability for Alternative 3b is provided in Table F-27 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3b is moderate. ❸

7.6.8 Cost

Evaluation of cost for Alternative 3b is provided in Table F-28 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix G. The overall rating on this criterion for Alternative 3b (present value cost) is moderate. $$$

7.7 State (Support Agency) Acceptance

State (support agency) acceptance is a modifying criterion under the NCP. Assessment of state acceptance will not be completed until comments on the final FS report are submitted to EPA. Thus, state acceptance is not considered in the detailed analysis of alternatives presented in the FS.

7.8 Community Acceptance

Community acceptance is also a modifying criterion under the NCP. Assessment of community acceptance will include responses to questions that any interested person in the community may have regarding any component of the remedial alternatives presented in the proposed plan. This assessment will be completed after EPA receives public comments on the proposed plan during the public commenting period. Thus, community acceptance is not considered in the detailed analysis of alternatives presented in the FS.

7.9 Comparative Analysis of Alternatives

This FS evaluated the 4 retained remedial alternatives discussed in this section against the two threshold criteria and five balancing criteria. The results of the detailed analysis for each remedial alterative are presented in Exhibit 7-5 to allow a comparative analysis of the alternatives and identify the key tradeoffs between them.

Using Exhibit 7-5, comparative analysis for the remedial alternatives using the threshold and balancing criteria has been put into narrative form in the following subsections. Only significant comparative differences between alternatives are presented; the full set of rationale for the qualitative ratings is provided in Appendix F.

7.9.1 Overall Protection of Human Health and the Environment

Of the 4 retained alternatives, only the "no action" alternative (i.e. Alternative 1) fails to provide protection for human health and the environment and did not address the PRAOs for contaminated soil. Thus, this alternative was given a rating of "none".

Alternative 2 address the PRAOs for contaminated soil through engineered controls and institutional controls to prevent contact with contaminated soil posing potential human health risks. Monitoring would be performed to ensure that the remedy components provide protection of human health after the remedy is put in place. However, contaminated soil still remains on site (below the covers placed during interim remedial action and on the surface at two locations within the Flyway Subarea) and could pose exposure risks if the remedy components are compromised. Thus this alternative was given a rating of "moderate".

Exhibit 7-5. Summary of Comparative Analysis of Alternatives

Remedial Alternative	Description	Threshold Criteria		Balancing Criteria					
		Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Present Value Cost (Dollars)	
1	No Action	0	0	0	0	0	5	$	$104,000
2	Institutional and Engineered Controls with Monitoring	3	4	3	0	4	3	$$$	$623,000
3a	In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring	3	4	4	0	3	3	$$$	$681,000
3b	In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring	3	4	4	0	3	3	$$$	$695,000

Notes:

1. The detailed analysis of retained alternatives involves a qualitative assessment of the degree to which remedial alternatives address evaluation criteria presented in Appendix F. The numerical designations for the qualitative ratings system used in this table are not used to quantitatively assess remedial alternatives (for instance, individual rankings for an alternative are not additive).
2. Detailed cost spreadsheets (cost summaries, present value analyses, and cost worksheets) for each alternative are presented in Appendix G.

Legend for Qualitative Ratings System:

Threshold and Balancing Criteria (Excluding Cost)		Balancing Criteria (Present Value Cost in Dollars)	
0	**None**	0	**None ($0)**
1	**Low**	$	**Low ($0 through $250K)**
2	**Low to Moderate**	$$	**Low to Moderate ($250K through $500K)**
3	**Moderate**	$$$	**Moderate ($500K through $1M)**
4	**Moderate to High**	$$$$	**Moderate to High ($1M through $1.5M)**
5	**High**	$$$$$	**High (Greater than $1.5M)**

Alternative 3a address the PRAOs for contaminated soil. Apart from engineered controls and institutional controls; additional in-place containment using soil covers on the west embankments of Highway 37 and the area surrounding sample 1-03000 within the Flyway Subarea would be used to prevent contact with contaminated soil posing potential human health risks. Monitoring would be performed to ensure that the remedy components provide protection of human health after the remedy is put in place. Contaminated soil still remains on site and could pose exposure risks if the remedy components are compromised. For this alternative, soil covers are placed over the two isolated locations within the Flyway subarea which comprise a very small area as compared to the overall site. While there would be some additional benefits to the long-term effectiveness and permanence of these isolated areas, there are also additional short-term impacts to workers and from implementing this remedy. The primary remedy components for the site as a whole are the institutional controls, engineered controls, and monitoring. Thus there is no significant additional increase in the overall protection of human health and the environment over Alternative 2. Therefore, this alternative was also given a rating of "moderate".

Alternative 3b address the PRAOs for contaminated soil. Apart from engineered controls and institutional controls; additional in-place containment using soil covers on the Highway 37 west embankments and limited removal (excavation) of area surrounding sample 1-03000 within the Flyway Subarea to prevent contact with contaminated soil posing potential human health risks. Monitoring would be performed to ensure that the remedy components provide protection of human health after the remedy is put in place. Contaminated soil still remains on site and could pose exposure risks if the remedy components are compromised. For this alternative, the active cleanup is performed over the three isolated areas within the Flyway subarea which comprise a very small area as compared to the overall site. Thus there is no significant additional increase in the overall protection of human health and the environment. Therefore, this alternative was also given a rating of "moderate".

7.9.2 Compliance with ARARs

Alternative 1 fails to be compliant with the chemical-specific ARARs identified for the site since no action is taken. Thus, this alternative was given a rating of "none".

Alternatives 2, 3a, and 3b would address the chemical-, location, and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. Based on the current assumptions, compliance with the potential ARAR of NESHAP 40 CFR Part 61 Subpart M regarding cover construction and engineered controls would be met by using the provision contained in 40 CFR 61.151(c).

However, it is unknown whether asbestos contamination exists within soil in the seasonally flooded areas of the Flyway Subarea. If asbestos contamination in soil is present, it may cause periodic exceedances of chemical-specific ARARs if there was wind dispersion of asbestos fibers to air during dry periods or migration of fibers to surface water during flooding. Thus, Alternatives 2 and 3 were given a rating of "moderate to high".

7.9.3 Long-Term Effectiveness and Permanence

Alternative 1 fails to provide long-term effectiveness and permanence since no action is taken. Thus, this alternative was given a rating of "none".

Alternative 2 provide protection of human health through engineered controls and institutional controls to prevent contact with contaminated soil posing potential human health risks. Monitoring would be performed to ensure that the remedy components provide protection of human health onsite. Since asbestos contamination remains within surface soil in the Flyway Subarea and in subsurface soil beneath covers constructed at the site, persons could be exposed to the contaminated soil if the integrity of previously constructed covers or engineered controls is compromised. Long-term effectiveness and permanence is not certain, thus this alternative was given a rating of "moderate".

Alternative 3a provides slightly higher long-term effectiveness and permanence by in-place containment of contaminated soil within the west embankments of Highway 37 and the area surrounding sample 1-03000 in the Flyway Subarea, which is otherwise left exposed under Alternative 2. While Alternative 3a relies on institutional and engineered controls and monitoring for long-term effectiveness, permanence of this alternative is slightly better than Alternative 2 since contaminated surface soil within the Flyway subarea is also contained in-place. Thus, this alternative was given a rating of "moderate to high".

Alternative 3b uses the same remedial strategy as Alternative 3a, apart from removal and offsite disposal of contaminated soil within the area surrounding sample 1-03000. Other than this localized area that would be excavated, the overall long-term effectiveness and permanence is similar to Alternative 3a. Thus, this alternative was also given a rating of "moderate to high".

7.9.4 Reduction of Toxicity, Mobility, or Volume through Treatment

All of the retained alternatives fail to provide a reduction of toxicity, mobility, or volume through treatment since treatment is not a component of these alternatives. Thus, all of the retained alternatives were given a rating of "none".

7.9.5 Short-Term Effectiveness

Alternative 1 fails to provide short-term effectiveness since no action is taken. Thus, this alternative was given a rating of "none".

Alternative 2 addresses the short-term risks to workers, the community, and the environment. Engineered controls (fencing and signage) could be quickly implemented to address potential exposure by the community to contaminated soil. Institutional controls would also be implemented to prevent uses that could pose risks to human health as well as protect the remedy components put in place during interim remedial actions as well as this alternative. . Duration of construction (engineered controls) would be short with minimal disturbance of the soil within the site. Short-term risks to workers would be mitigated through the use of safety measures such as water-based dust suppression and personal protective equipment (PPE). Thus, this alternative was given a rating of “moderate to high”.

Alternative 3a also addresses the short-term risks to workers, the community, and the environment. Institutional and engineered controls could be quickly implemented similarly to Alternative 2 to address potential exposure by the community to contaminated soil. Apart from construction of engineered controls, Alternative 3a would include in-place containment of contaminated soils within the west embankments of Highway 37 and the area surrounding sample 1-03000 of the Flyway Subarea. Since this alternative includes placement of covers within the right-of-way of Highway 37, there are potential impacts to the community such as lane closures, which could affect safety of the traveling public. Short-term risks to workers would be mitigated through the use of safety measures such as water-based dust suppression and PPE. Since this alternative also involves greater disturbance of contaminated soil than for Alternative 2, it poses additional risks to workers and the community that have to be mitigated. Thus, this alternative was given a rating of “moderate”.

Alternative 3b uses the same remedial strategy as Alternative 3a to addresses the short-term risks to workers, the community, and the environment. The primary difference between this alternative and Alternative 3a is the removal and offsite disposal of excavated contaminated soil which could potentially increase the risk of exposure to workers and the community. However the excavation volume requiring offsite disposal is relatively small and the haul route to the former Libby vermiculite mine from the Flyway subarea only travels public roads for a very short distance. Thus, this alternative has minimal additional risks to workers and the community when compared to Alternative 3a. Thus, this alternative was also given a rating of “moderate”.

7.9.6 Implementability

Alternative 1 has no action taken other than 5-year site reviews, which can be readily implemented. Thus, this alternative was given a rating of high.

Alternative 2 requires construction of engineered controls around the seasonally flooded areas within the Flyway Subarea. The construction resources and materials needed to construct the fencing for this alternative should be easily available. Maintenance of the covered areas and monitoring would be relatively easy, but construction and maintenance of engineered controls within the seasonally flooded areas could be difficult during periods of high water in the Kootenai River. Institutional controls could be challenging for the site since some of the property is under private ownership. Thus, this alternative was given a rating of “moderate”.

Alternative 3a has similar institutional and engineered controls as well as monitoring components as Alternative 2. However, Alternative 3a also requires in-place containment of contaminated soil using covers over two isolated areas within the west embankments of Highway 37 and the area surrounding sample 1-03000. The construction resources and materials needed to construct the covers for this alternative should be available. Maintenance of the covered areas, engineered controls and monitoring would be relatively easy. While there would be some logistical concerns and approvals required from State of Montana agencies during construction of covers within the right-of-way of Highway 37, the required soil cover construction comprises a very small area and it is anticipated that it can be performed without significant adverse impacts to the implementability of this Alternative. Thus, this alternative was given a rating of “moderate”.

Alternative 3b has similar institutional and engineered controls as well as monitoring components as Alternative 3a. Apart from in-place containment of contaminated soils within the west embankments of Highway 37, this alternative also requires removal and offsite disposal of contaminated soil from the area surrounding sample 1-03000. Under the alternative there is an overall decrease in volume of clean soil imported from alternative 3a, but this alternative also requires offsite hauling of excavated contaminated soil. Disposal of the excavated soil at the former Libby vermiculite mine would require approvals from State of Montana agencies. However it is anticipated that offsite disposal can be performed without any significant adverse impacts to the implementability when compared to Alternatives 3a. Thus, this alternative was also given a rating of “moderate”.

7.9.7 Cost

Present value costs for all alternatives were evaluated over a 30-year period (Years 1 through 30).

The present value cost for Alternative 1 was given a rating of “low”. The present value cost for this alternative is approximately $104,000.

The present value cost for Alternative 2 was given a rating of “moderate”. The present value cost for this alternative is approximately $623,000.

The present value cost for Alternative 3a was given a rating of “moderate”. The present value cost for this alternative is approximately $681,000.

The present value cost for Alternative 3b was given a rating of “moderate”. The present value cost for this alternative is approximately $695,000.

Section 8
Summary

This feasibility study (FS) report was prepared based on the remedial investigation (RI) report prepared for the former Screening Plant Site, Operable Unit 2 (OU2) of the Libby Asbestos Site and was prepared in accordance with the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under Comprehensive Environmental Response Compensation and Liability Act* (CERCLA) *Interim Final* (U. S. Environmental Protection Agency [EPA] 1988a), *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA 2000), and the *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP).

The purpose of this FS report is to help identify appropriate cleanup strategies and methods for accomplishing the cleanup to protect human health and the environment. This FS determined the viable remedial action alternatives for cleanup of contaminated soil present within the former Screening Plant Site (OU2) and evaluated the alternatives to allow stakeholders to choose a preferred remedy for inclusion in a Proposed Plan (PP) for OU2.

Libby amphibole (LA) asbestos has been observed in all the media sampled at the site; i.e. indoor air, indoor dust, outdoor ambient air, outdoor air near disturbed soil, and soil (surface and subsurface). Following are the key findings from OU2 sampling, as related to the data that represent the current status of the site:

- LA has been observed in all the media sampled at the site: indoor air, indoor dust, outdoor ambient air, outdoor air near disturbed soil, and soil (surface and subsurface). All complete exposure pathways have been broken through the previously completed removal actions or through investigation been found to be below levels of concern, with the possible exception of outdoor air near disturbed soil in an isolated portion of the Highway 37 ROW and in the area surrounding sample location 1-03000. Both of these locations are within the Flyway (Subarea 2).

- The ambient air concentrations observed at OU2 indicate a risk range related to ambient air at OU2 to be between 5E-08 and 1E-07 (EPA 2009).

- Vermiculite-containing soil is known to exist in the subsurface and is contained below engineered caps placed during the removal activities.

- The majority of residual contamination is present at depths greater than or equal to 4 feet bgs and in several isolated areas at depths less than 4 feet bgs within the former Screening Plant subarea north of Rainy Creek.

- The majority of the excavated areas within the Flyway met EPA's clearance criteria (<1% LA at depth) at depths varying from less than 1 foot bgs to greater than 4 feet bgs. However, LA concentrations ≥1% have been detected in confirmation soil samples collected at the eastern boundary of the Flyway within the Highway 37 ROW at depths less than 1 foot bgs up to 2 feet bgs. LA was observed in surface soils in one area (area surrounding sample 1-03000) not previously remediated at concentrations of <1%.

- Within the Flyway portion of the Highway 37 ROW is an isolated area with concentrations of LA of >1% at less than 1 foot bgs.
- The majority of Subarea 3 does not contain residual contamination; however, one confirmation soil sample collected along the north portion of the property contained <1% LA at a depth of 1 foot bgs.
- Residual contamination is present along the Rainy Creek Road Frontages at a depth between 1 and 2 feet bgs.
- Air data collected in OU2 (before and during cleanup) and in other parts of the Libby Superfund site establish that disturbance of soils that contain vermiculite and LA can lead to the release of LA fibers into air, and this would increase the risk of cancer in any people who were exposed on a regular basis.

All retained remedial alternatives in this FS would primarily address human health risks, since ecological risks were not evaluated for OU2. However, it is assumed in this FS that risks to any present ecological receptors are minimal. A comprehensive assessment of ecological risks will be completed as part of OU3 (the mine site) of the Libby Asbestos Superfund Site.

During the FS, preliminary remedial action objectives (PRAOs) were identified and remedial technologies and process options were developed and screened for the contaminated medium (soil contaminated with asbestos). Six remedial alternatives were assembled from the retained technologies to address contaminated soil. Screening of these alternatives was performed based on effectiveness, implementability, and cost to reduce the number of alternatives for detailed analysis.

Four alternatives retained after screening were evaluated in detail and compared based on first seven of the nine NCP remedy selection criteria. Evaluation of state and community acceptance (the last two of the nine NCP criteria) will be conducted after comments are received on the PP and are not evaluated at this stage of the FS process.

Preliminary Remedial Action Objectives (PRAOs): Based on the risks that exists onsite and anticipated future residential and/or commercial use of the site, the following PRAOs were developed for contaminated soil at the site:

1. Mitigate the potential for inhalation exposures to asbestos fibers that would result in risks that exceed the target cancer risk range specified by EPA of 1E-06 to 1E-04
2. Control erosion of contaminated soil by wind and water from source locations to prevent the spread of contamination to unimpacted locations and media
3. Implement controls to prevent uses of the site that could pose unacceptable risks to human health or the environment or compromise the remedy.

General Response Actions (GRAs): GRAs considered for remediation of the contaminant medium (i.e. contaminated soil) include the following:

- No action
- Monitoring
- Institutional controls
- Engineered controls
- Containment
- Removal, transport, and disposal
- Treatment

Remedial technologies and process options identified for each of the GRAs were broadly evaluated or screened with respect to overall technical implementability and suitability of the technology for treatment of sitewide contamination and further evaluated for effectiveness, implementability, and cost.

Development and Screening of Alternatives: Remedial action alternatives are assembled by combining the retained remedial technologies and process options. Following are the remedial alternatives that were assembled by combining the retained remedial technologies and process options:

Alternative 1: No Action
Alternative 2: Institutional and Engineered Controls with Monitoring
Alternative 3a: In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring
Alternative 3b: In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring
Alternative 4: Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring
Alternative 5: Removal of Contaminated Soil within the Flyway Subarea, Offsite Thermo-Chemical Treatment and Reuse of Treated Material, Institutional and Engineered Controls with Monitoring

These remedial action alternatives were screened and evaluated for effectiveness, implementability, and cost to reduce the number of alternatives retained for detailed analysis.

Detailed Analysis of Retained Alternatives: Remedial alternatives retained after the initial screening and evaluation undergo detailed analysis. During detailed analysis, each alternative is assessed using seven NCP evaluation criteria previously mentioned. The following alternatives were retained for detailed analysis:

Alternative 1: No Action
Alternative 2: Institutional and Engineered Controls with Monitoring
Alternative 3a: In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring
Alternative 3b: In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Comparative Analysis: Each remedial alterative undergoing detailed analysis was then compared using the seven NCP evaluation criteria as presented in Exhibit 8-1.

After the FS is finalized, a preferred alternative for the site will be presented to the public in a PP. The PP alternative may be a combination of the retained alternatives. The PP will briefly summarize the alternatives studied in the detailed analysis phase of the RI/FS, highlights the key factors that led to identifying the Preferred Alternative. The PP allows the State of Montana (through the Montana Department of Environmental Quality (DEQ) and the community to provide comment on the preferred alternative.

Exhibit 8-1. Summary of Comparative Analysis of Alternatives

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3a	Alternative 3b
Overall protection of human health and the environment	⓿ Not protective of human health and the environment and does not meet PRAOs.	❸ Protective of human health and the environment and meets PRAOs; however contamination would remain in subsurface soil beneath protective covers, preventing unrestricted use of the site.	❸ Protective of human health and the environment and meets PRAOs; however contamination would remain in subsurface soil beneath protective covers, preventing unrestricted use of the site.	❸ Protective of human health and the environment and meets PRAOs; however contamination would remain in subsurface soil beneath protective covers, preventing unrestricted use of the site.
Compliance with ARARs	⓿ Not compliant with ARARs.	❹ Compliant with ARARs.	❹ Compliant with ARARs.	❹ Compliant with ARARs.
Long-term effectiveness and permanence	⓿ Does not address soil contamination.	❸ Long-term effective remedy using existing protective covers (placed during interim remedial actions over contaminated soil). Engineered controls, institutional controls, and monitoring would be implemented to protect the remedy. Contamination would remain in subsurface soil beneath protective covers, preventing unrestricted use of the site.	❹ Similar to Alternative 2; however provides additional protection to human receptors from contaminated soil within the Flyway Subarea through in-place containment (protective covers).	❹ Similar to Alternative 3a; however provides additional protection to human receptors from contaminated soil within the Flyway Subarea through a combination of in-place containment (protective covers) as well as removal (excavation) and offsite disposal at the former Libby vermiculite mine.
Reduction of toxicity, mobility, or volume through treatment	⓿ Provides no treatment; therefore, does not provide for reduction of toxicity, mobility, or volume of contaminants through treatment.	⓿ Provides no treatment; therefore, does not provide for reduction of toxicity, mobility, or volume of contaminants through treatment.	⓿ Provides no treatment; therefore, does not provide for reduction of toxicity, mobility, or volume of contaminants through treatment.	⓿ Provides no treatment; therefore, does not provide for reduction of toxicity, mobility, or volume of contaminants through treatment.
Short-term effectiveness	⓿ Does not address soil contamination.	❹ Limited amount of surface soils would be disturbed for installation of engineered controls. Dust suppression, air monitoring, and PPE help mitigate risks to workers.	❸ Similar to Alternative 2; however a larger area of surface soil would be disturbed during protective cover placement. Traffic control measures would be required during cover construction due the proximity to Hwy 37. Dust suppression, air monitoring, and PPE help mitigate risks to workers. Hauling of clean soil for covers potentially impacts the community.	❸ Similar to Alternative 3a; however a slightly larger area of surface soil would be disturbed during cover placement and contaminated soil removal. Traffic control measures would be required during cover construction due the proximity to Hwy 37. Dust suppression, air monitoring, and PPE help mitigate risks to workers. Hauling of clean soil for covers/backfill and contaminated soil to the former Libby vermiculite mine potentially impacts the community; however the small overall volume and proximity to the former Libby vermiculite mine minimizes these additional risks

Exhibit 8-1. Summary of Comparative Analysis of Alternatives (continued)

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3a	Alternative 3b
Implementability	❺ Easily implemented because no action is taken other than 5-year site reviews.	❸ Uses standard construction techniques and materials for engineered controls (fencing and warning signs). Construction within the seasonally flooded areas could be difficult. Institutional controls could be challenging since portions of the property are under private ownership. Monitoring could be easily implemented.	❸ Similar to Alternative 2; however additional cover would be placed within the Flyway Subarea. While there would be additional logistical concerns for construction of covers within the Highway 37 right-of-way, it is anticipated that there would be no significant adverse impacts on implementability over Alternative 2.	❸ Similar to Alternative 3a; however a combination of cover and removal/offsite disposal would be performed within the Flyway Subarea. While there would be additional logistical concerns for construction of covers within the Highway 37 right-of-way and disposal of contaminated soil offsite, it is anticipated that there would be no significant adverse impacts on implementability over Alternative 3a.
Present Value Cost ($)	$ $104,000	$$$ $623,000	$$$ $681,000	$$$ $695,000

Legend for Qualitative Ratings System:

Evaluation Criteria (Excluding Cost)		Present Value Cost in Dollars)	
⓿	**None**	⓿	**None ($0)**
❶	**Low**	$	**Low ($0 through $250K)**
❷	**Low to Moderate**	$$	**Low to Moderate ($250K through $500K)**
❸	**Moderate**	$$$	**Moderate ($500K through $1M)**
❹	**Moderate to High**	$$$$	**Moderate to High ($1M through $1.5M)**
❺	**High**	$$$$$	**High (Greater than $1.5M)**

Section 9
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Tables

Identification and Technical Implementability Screening of Potentially Applicable Remedial Technologies/Process Options Contaminated Soil

General Response Actions	Remedial Technology	Process Option	Description of Option	Screening Comments	Retained
No Action	None	None	No action would be taken. Contaminated soil would remain in their existing conditions.	Required by NCP as baseline for comparison.	Yes
Monitoring	Inspection	Non-Intrusive Visual Inspection	A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of contaminated soil.	Potentially implementable process option.	Yes
		Intrusive Visual Inspection	An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of contaminated soil.	Potentially implementable process option.	Yes
	Sampling and Analysis	Sample Collection and Microscopic Analysis	Air and/or soil samples would be collected for microscopic analysis in a laboratory to determine the potential presence of asbestos fibers. Types of samples collected include but are not limited to soil, ambient air, and ABS. Types of microscopic analyses include but are not limited to PLM, stereomicroscopy, and TEM.	Potentially implementable process option.	Yes
Institutional Controls	Land Use Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Contact with contaminated soil would be controlled through legal instruments. Examples of governmental (state or local) controls include but are not limited to zoning restrictions, ordinances, statutes, codes or regulations, building permits, or other provisions that restrict land or resource use at a site. Examples of proprietary controls include but are not limited to instruments such as easements and covenants, in the event that the city of Libby decides to transfer the property to a private ownership. Examples of informational devices include but are not limited to state registries of contaminated properties, deed notices, and advisories.	Potentially implementable process option.	Yes
	Community Awareness	Information and Education Programs	Community information and education programs would be undertaken to enhance awareness of potential hazards and remedies for contaminated soil.	Potentially implementable process option.	Yes
Engineered Controls	Access Restrictions	Fencing and Posted Warnings	Contaminated soil would be enclosed by fences and warning signs to control access by human receptors and some ecological receptors.	Potentially implementable process option.	Yes

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Screening Comments*	*Retained*
Containment	Surface Source Controls	Water-Based Suppression	Contaminated soil would be kept “adequately wet” using water or a water-based dust suppressant to control airborne migration of asbestos fibers from contaminated soil to the surrounding environment.	Potentially implementable process option.	Yes
		Chemical-Based Suppression	Contaminated soil would be treated with a resinous or petroleum-based chemical dust suppressant to control airborne migration of asbestos fibers from contaminated soil to the surrounding environment.	Potentially implementable process option.	Yes
		In Situ Mixing	Contaminated soil would be mixed with underlying uncontaminated soil or fill materials.	Potentially implementable process option.	Yes
		Soil or Rock Exposure Barrier/Cover	Contaminated soil would be covered with a layer of clean soil or rock with sufficient thickness to eliminate exposure risks to receptors.	Potentially implementable process option.	Yes
		Asphalt or Concrete Exposure Barrier/Cover	Contaminated soil would be covered with layers of asphalt or concrete with sufficient thickness to eliminate exposure risks to receptors.	Potentially implementable process option.	Yes
		Geosynthetic Multi-Layer Exposure Barrier/Cover	Contaminated soil would be covered with geosynthetic material (such as geomembrane or a geosynthetic clay liner [GCL]) along with protective vegetative or rock layers to eliminate exposure risks to receptors.	Potentially implementable process option.	Yes
Removal, Transport, Disposal	Removal	Mechanical Removal (Excavation)	Contaminated soil would be removed using mechanical excavation methods.	Potentially implementable process option.	Yes
	Transport	Mechanical Transport (Hauling/Conveying)	Contaminated soil would be transported by truck or other mechanical conveyance method.	Potentially implementable process option.	Yes
		Hydraulic Transport (Slurrying)	Contaminated soil would be transported in slurry form using a pipeline or other hydraulic conveyance system.	Potentially implementable process option.	Yes
		Pneumatic Transport (Vacuum Truck/ Pumping)	Contaminated soil would be transported using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	Potentially implementable process option.	Yes
	Disposal	Onsite Disposal	Removed contaminated soil would be disposed of at an onsite location authorized for disposal of asbestos.	Not technically feasible for site application because the site has limited space and onsite consolidation facility can not be build.	No
		Offsite Disposal	Removed contaminated soil would be disposed of at the Former Libby Asbestos Vermiculite Mine.	Potentially implementable process option.	Yes

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Screening Comments*	*Retained*
Treatment	Biological Treatment	Vermiprocess	Worms are employed to convert contaminated soil into a non-regulated material.	Not technically feasible for site application because it has not been demonstrated for large-scale remediation of ACM and associated soil.	No
		Phytoremediation	Contaminated soil would be treated/removed using select plant species.	Not technically feasible for site application because no plant has been identified that can remove asbestos from ACM and associated soil through phytoremediation.	No
	Chemical and/or Physical Treatment	Pozzolan- or Cement-Based Stabilization/Solidification	Contaminated soil would be mixed with a pozzolan- or cement-based binding agent before disposal.	Potentially implementable process option.	Yes
		Pozzolan- or Cement-Based In Situ Stabilization/Solidification	Contaminated soil would be mixed in situ with a pozzolan- or cement-based binding agent using a deep soil auger mixing/injection technique.	Potentially implementable process option.	Yes
		Chemical Decomposition	Contaminated soil would be decomposed to an amorphous silica suspension at relatively low temperatures (~100°C) using chemicals tailored to the waste stream. The resulting amorphous silica would then be solidified for disposal as a non-regulated waste. ABCOV™ is a demonstrated form of this technology.	Potentially implementable process option.	Yes
		Chemical Digestion	ACM and associated soil would be treated using a spray-applied foam that soaks into porous materials and converts chrysotile asbestos contained within to an inert, non-fiberous form. DMA® is a commercial form of this technology.	Not technically feasible for site application because the technology is only applicable to chrysotile asbestos-containing porous materials that can readily absorb the digestion agent and does not affect amosite asbestos.	No
		Soil Washing	ACM-associated soil would be flushed with a site-specific washing solution; flushed asbestos would be collected for further treatment and/or disposal.	Not technically feasible for site application because it has not been identified or demonstrated for remediation of ACM and associated soil.	No
		Soil Flushing	A washing solution (as with soil washing) would be circulated through ACM-associated soil with the use of injection and extraction wells or trenches; flushed asbestos would be collected for further treatment and/or disposal.	Not technically feasible for site application because it has not been identified or demonstrated for remediation of ACM and associated soil.	No
	Thermal Treatment	In Situ Vitrification	An electrical current would be passed between electrodes inserted into in-place contaminated soil to cause melting. The melted matrix is then allowed to cool in place into a solid vitrified glass mass.	Potentially implementable process option.	Yes

Table 4-1 (continued)
Identification and Technical Implementability Screening of Potentially Applicable Remedial Technologies/Process Options
Contaminated Soil

General Response Actions	Remedial Technology	Process Option	Description of Option	Screening Comments	Retained
Treatment – Continued	Thermal Treatment – Continued	Electric Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes in a furnace creating an electrical arc. Contaminated soil placed in the furnace form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	Potentially implementable process option.	Yes
		Plasma Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes to form plasma. Contaminated soil placed in the plasma arc form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	Potentially implementable process option.	Yes
		Incineration (Ex Situ)	Vermiculite and associated soil would be crushed and mixed. The mixture is subjected to incineration without chemical additives. The reaction product is an inert waste.	Not technically feasible for site application because it has not been identified or demonstrated for remediation of ACM and associated soil.	No
	Thermal/Chemical Treatment	Thermo-Caustic Dissolution	Contaminated soil would be placed into a high temperature caustic (strong basic) solution. Asbestos fibers are partially to fully converted (changed to an amorphous structure) during immersion. Partially converted asbestos fibers are further converted using chemical reactions to form a viscous mixture, which is later vitrified. The resulting reaction product (glass) is an amorphous inert waste.	Potentially implementable process option.	Yes
		Thermo-Chemical Treatment	Contaminated soil would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. This process is similar to vitrification but does not involve complete melting. Instead, the process results in partial sintering of the material. The resulting reaction product (rock-like material) is an inert waste. Thermo-chemical conversion technology (TCCT), patented by ARI Technologies Inc., (ARI) is a commercial form of this technology.	Potentially implementable process option.	Yes

Notes:

1. The screening process for technical implementability involves a qualitative assessment of the degree to which process options address evaluation criteria presented in Section 4.5.

2. Shading indicates remedial technologies/process options have been eliminated from further consideration based on lack of technical implementability. Remaining (unshaded) remedial technologies/process options have been retained for additional screening in Table 4-2.

Table 4-2
Screening of Potentially Applicable Remedial Technologies/Process Options Based on Effectiveness, Implementability, and Relative Cost
Contaminated Soil

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Effectiveness*	*Implementability*	*Relative Cost*		*Reasons for Elimination of Process Option from Consideration*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
						Capital Cost	*O&M Cost*		
No Action	None	None	No action would be taken. Contaminated soil would remain in their existing conditions.	⓿ No protection of human health or the environment and no compliance with ARARs.	⓿ Easily implemented but is not acceptable to regulatory agencies and does not meet ARARs.	⓿	⓿	Retained	Required by NCP as stand-alone alternative.
Monitoring	Inspection	Non-Intrusive Visual Inspection	A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of contaminated soil.	❷ Protects human receptors by monitoring contaminant concentrations and migration. Does not directly affect receptors and does not physically address contaminants.	❺ Easily implemented using available technical labor resources.	$	⓿	Retained	Viable for short- and long-term site monitoring.
		Intrusive Visual Inspection	An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of contaminated soil.	❷ Protects human receptors by monitoring contaminant concentrations and migration. Does not directly affect receptors and does not physically address contaminants.	❺ Easily implemented using available technical labor resources.	$$	⓿	Retained	Viable for short- and long-term site monitoring.
	Sampling and Analysis	Sample Collection and Microscopic Analysis	Air and/or soil samples would be collected for microscopic analysis in a laboratory to determine the potential presence of asbestos fibers. Types of samples collected include but are not limited to soil, ambient air, and ABS. Types of microscopic analyses include but are not limited to PLM, stereomicroscopy, and TEM.	❷ Protects human receptors by monitoring contaminant concentrations and migration. Does not directly affect receptors and does not physically address contaminants.	❺ Easily implemented using available technical labor and equipment resources.	$$$	⓿	Retained	Viable for short- and long-term site monitoring.
Institutional Controls	Land Use Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Contact with contaminated soil would be controlled through legal instruments. Examples of governmental (state or local) controls include but are not limited to zoning restrictions, ordinances, statutes, codes or regulations, building permits, or other provisions that restrict land or resource use at a site. Examples of proprietary controls include but are not limited to instruments such as easements and covenants, in the event that the city of Libby decides to transfer the property to a private ownership. Examples of informational devices include but are not limited to state registries of contaminated properties, deed notices, and advisories.	❷ Restricts future uses of the site that are not protective of human health and the environment but does not physically address contamination.	❸ Implemented using legal instruments and labor resources; potential public resistance.	$$	$	Retained	Potentially viable process option for combination with engineered controls or contaminated soil containment and/or disposal technologies in which wastes posing a threat to receptors are left on site.
	Community Awareness	Information and Education Programs	Community information and education programs would be undertaken to enhance awareness of potential hazards and remedies for contaminated soil.	❷ Protects human receptors by enhancing awareness of potential site hazards and remedies. Does not directly affect ecological receptors and does not physically address contamination.	❺ Easily implemented using available technical and community involvement labor resources.	$	$	Retained	Potentially viable process option for combination with all other technologies.
Engineered Controls	Access Restrictions	Fencing and Posted Warnings	Contaminated soil would be enclosed by fences and warning signs to control access by human receptors and some ecological receptors.	❷ Protects human receptors through warnings and restricted access through fencing though human receptors may choose to ignore warnings and circumvent fencing. Does not directly affect many types of ecological receptors that can circumvent fencing.	❺ Easily implemented and resources readily available.	$$	$	Retained	Potentially viable process option for combination with institutional controls or contaminated soil containment and/or disposal technologies in which wastes posing a threat to receptors are left on site.

General Response Actions	Remedial Technology	Process Option	Description of Option	Effectiveness	Implementability	Relative Cost		Reasons for Elimination of Process Option from Consideration	Process Option Viability with Respect to Assembly of Remedial Alternatives
						Capital Cost	O&M Cost		
Containment	Surface Source Controls	Water-Based Suppression	Contaminated soil would be kept "adequately wet" using water or a water-based dust suppressant to control airborne migration of asbestos fibers from contaminated soil to the surrounding environment.	❸ Wetting contaminated soil for dust suppression inhibits asbestos fiber transport by air, but frequent wetting may facilitate asbestos transport through surface runoff. Does not provide long-term effectiveness without continuous re-application.	❹ Easily implemented and construction resources readily available. A suitable water supply must be located. Requires continuous re-application to ensure protectiveness.	$$	$$	Retained	Not viable as a long-term solution; however, it is a potentially viable process option for combination with contaminated soil removal, disposal, and/or treatment technologies.
		Chemical-Based Suppression	Contaminated soil would be treated with a resinous or petroleum-based chemical dust suppressant to control airborne migration of asbestos fibers from contaminated soil to the surrounding environment.	❸ Chemically treating contaminated soil inhibits LA fiber transport by air. Does not provide long-term effectiveness without frequent re-application.	❸ Implementable and construction resources readily available. May be difficult to ensure uniform application of the chemical suppressant over the contaminated soil. Requires frequent re-application to ensure protectiveness.	$$$	$$$	Retained	Not viable as a long-term solution; however, it is a potentially viable process option for combination with contaminated soil removal, disposal, and/or treatment technologies.
		In Situ Mixing	Contaminated soil would be mixed with underlying uncontaminated soil or fill materials.	❶ Reduces future asbestos releases from surface soil after implementation; however, there is potential for subsurface contaminated soil to migrate back to the surface over time through natural and/or human activities. It does not protect receptors by itself.	❷ Implemented using available construction resources. Difficulty may be encountered in homogenizing contaminated soil with underlying soil and depth to bedrock may preclude in situ mixing at some locations. May require re-application over time if subsurface contaminated soil migrates to the surface. Must be combined with institutional and engineered controls.	$$$$	$$	Effectiveness, Implementability	Eliminated from consideration.
		Soil or Rock Exposure Barrier/Cover	Contaminated soil would be covered with a layer of clean soil or rock with sufficient thickness to eliminate exposure risks to receptors.	❹ Protects receptors by eliminating surface exposure of contaminants. Prevents contaminated soil erosion and LA fiber transport by air and water.	❹ Implemented using available construction resources and materials. Must be combined with institutional and engineered controls. Requires some maintenance for long-term protectiveness.	$$$	$$	Retained	Viable as a long-term solution.
		Asphalt or Concrete Exposure Barrier/Cover	Contaminated soil would be covered with layers of asphalt or concrete with sufficient thickness to eliminate exposure risks to receptors.	❹ Protects receptors by eliminating surface exposure of contaminants. Prevents contaminated soil erosion and LA fiber transport by air and water.	❹ Implemented using available construction resources and materials. Must be combined with institutional and engineered controls. Requires some maintenance for long-term protectiveness.	$$$$	$$$	Retained	Viable as a long-term solution.
		Geosynthetic Multi-Layer Exposure Barrier/Cover	Contaminated soil would be covered with geosynthetic material (such as geomembrane or a GCL) along with protective vegetative or rock layers to eliminate exposure risks to receptors.	❹ Protects receptors by eliminating surface exposure of contaminants. Prevents contaminated soil erosion and LA fiber transport by air and water.	❸ Implemented using available construction resources; however, special material and labor resources are required to install the geosynthetic material. Care must be taken during installation to avoid damage to the geosynthetic. Must be combined with institutional and engineered controls. Requires some maintenance for long-term protectiveness.	$$$$	$$$	Retained	Viable as a long-term solution.
Removal, Transport, Disposal	Removal	Mechanical Removal (Excavation)	Contaminated soil would be removed using mechanical excavation methods.	❹ Protects receptors by eliminating future exposure to contaminated soil and migration of LA fibers after implementation. Must be combined with containment, transport, disposal, and/or treatment technologies.	❸ Implemented using available construction resources. Must be combined with source controls during implementation to provide protection to workers and the environment.	$$$$	⓿	Retained	Viable as a long-term solution; must be combined with contaminated soil transport, disposal, and/or treatment technologies.
	Transport	Mechanical Transport (Hauling/Conveying)	Contaminated soil would be transported by truck or other mechanical conveyance method.	❸ Protects receptors by eliminating future exposure to contaminated soil and migration of LA fibers after implementation. Must be combined with removal, containment, disposal, and/or treatment technologies.	❹ Easily implemented using available construction resources; efficient for all sizes of materials. Useful for onsite or offsite actions. Must be combined with source controls during implementation to provide protection to workers and the environment.	$$$$	⓿	Retained	Viable as a long-term solution; must be combined with contaminated soil removal, disposal, and/or treatment technologies.

General Response Actions	Remedial Technology	Process Option	Description of Option	Effectiveness		Implementability		Relative Cost: Capital Cost	Relative Cost: O&M Cost	Reasons for Elimination of Process Option from Consideration	Process Option Viability with Respect to Assembly of Remedial Alternatives
Removal, Transport, Disposal – Continued	Transport – Continued	Hydraulic Transport (Slurrying)	Contaminated soil would be transported in slurry form using a pipeline or other hydraulic conveyance system.	❸	Protects receptors by eliminating future exposure to contaminated soil and migration of LA fibers after implementation. Must be combined with removal, containment, disposal, and/or treatment technologies.	❷	Efficient for soil and gravel or smaller particle sizes. Only useful for onsite actions. Difficult to transport large size contaminated soil and debris materials or may require higher flow velocities, which can cause more abrasive wear on equipment. Treatment of water used for transport would be required. Grinding or pulverizing of large size contaminated soil and debris for hydraulic transportation would be required and may conflict with ARARs.	$$$$	⓿	Implementability	Eliminated from consideration.
		Pneumatic Transport (Vacuum Truck/ Pumping)	Contaminated soil would be transported using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	❸	Protects receptors by eliminating future exposure to contaminated soil and migration of LA fibers after implementation. Effective in performing removal of small and fine material during excavation. Must be combined with removal, containment, disposal, and/or treatment technologies.	❸	Efficient for soil and gravel or smaller particle sizes; however, filtering and containment of air stream would be required. Only useful for onsite actions. High abrasive wear on equipment may occur depending on type of job performed. Grinding or pulverizing of large size contaminated soil and debris transportation would be required and may conflict with ARARs. This concern can be eliminated if used for finer or smaller sized contaminated soil.	$$$$	⓿	Retained	Viable as a long-term solution; must be combined with contaminated soil removal, disposal, and/or treatment technologies.
	Disposal	Offsite Disposal	Removed contaminated soil would be disposed of at the Former Libby Asbestos Vermiculite Mine.	❹	Protects receptors by eliminating exposure to contaminated soil and migration of LA fibers at original location and provides containment of contaminated soil within an engineered disposal facility. Must be combined with removal, transport, and/or treatment technologies.	❹	Implemented using the Former Libby Asbestos Vermiculite Mine.	$$$$$	⓿	Retained	Viable as a long-term solution; must be combined with contaminated soil removal and transport technologies.
Treatment	Chemical/Physical Treatment	Pozzolan- or Cement-Based Stabilization/Solidification	Contaminated soil would be mixed with a pozzolan- or cement-based binding agent before disposal.	❹	Protects receptors by eliminating exposure to asbestos and migration of contaminated soil. Effectiveness of stabilization may decrease over time due to development of freeze-thaw cracking. Must be combined with removal, transport, and disposal technologies.	❷	Implemented using available construction resources. Difficult to obtain and transport large quantities of binding agent and homogenize binding agent with heterogeneous vermiculite debris and soil. Containment technologies required to protect receptors and the environment from release of asbestos fibers during implementation.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
		Pozzolan- or Cement-Based In Situ Stabilization/Solidification	Contaminated soil would be mixed in situ with a pozzolan- or cement-based binding agent using a deep soil auger mixing/injection technique.	❹	Protects receptors by eliminating exposure to LA and migration of LA. Contaminated soil would be treated in place, which minimizes exposure to receptors and the environment. Effectiveness of stabilization may decrease over time due to development of freeze-thaw cracking.	❶	Implemented using available construction resources. Debris piles are scattered over site, which include large quantities of contaminated soil that vary in depth and extent. Difficult to obtain and transport large quantities of binding agent and homogenize binding agent with vermiculite debris and soil. Depth to bedrock may preclude in situ mixing at some locations.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*		*Effectiveness*		*Implementability*	*Relative Cost*		*Reasons for Elimination of Process Option from Consideration*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
								Capital Cost	*O&M Cost*		
Treatment – Continued	Chemical/Physical Treatment – Continued	Chemical Decomposition	Contaminated soil would be decomposed to an amorphous silica suspension at relatively low temperatures (~100°C) using chemicals tailored to the waste stream. The resulting amorphous silica would then be solidified for disposal as a non-regulated waste. ABCOV™ is a demonstrated form of this technology.	❹	Protects receptors by converting contaminated soil to an inert form. The treatment is irreversible. Once treated, the non-regulated material and soil can be used for site restoration. Must be combined with removal and transport technologies.	❶	Implemented using a patented and demonstrated technology; however, commercialization of the technology is not fully developed. There is only one vendor in the U.S. offering this technology, which requires special chemicals tailored to the waste stream. The treatment process requires physical separation/segregation of contaminated soil into similar materials and associated soil and adjustment of the chemicals for the waste streams. Containment technologies required to protect receptors and the environment from release of asbestos fibers during implementation.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
	Thermal Treatment	In Situ Vitrification	An electrical current would be passed between electrodes inserted into in-place contaminated soil to cause melting. The melted matrix is then allowed to cool in place into a solid vitrified glass mass.	❸	Protects receptors by converting contaminated soil to an inert form. The treatment is irreversible. Contaminated soil would be treated in place, which minimizes exposure to receptors and the environment during implementation. Effectiveness is highly dependent on the nature of the subsurface; heterogeneity of the vermiculite and soil, lack of groundwater, and variable depth to bedrock would impact effectiveness.	❶	Implemented using a patented, demonstrated, and commercialized technology. The technology requires a significant, reliable source of electrical power. Difficult to implement since technology is mainly dependent on the electrical conductivity of the subsurface; contaminated soil are highly heterogeneous. Lack of saturated soil in the subsurface hinder the implementation of this technology. Depth to bedrock may also complicate in situ vitrification at some locations. The system requires off-gas treatment system to address air emissions.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
		Electric Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes in a furnace creating an electrical arc. Contaminated soil placed in the furnace form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	❹	Protects receptors by converting contaminated soil to an inert form. The treatment is irreversible. Once treated, the non-regulated material and soil can be used for site restoration. Must be combined with removal and transport technologies. Offsite transportation of contaminated soil could negatively impact the community.	❶	Implemented using a patented, demonstrated, and commercialized technology. However, the literature does not indicate that electric arc furnace units are widely available commercially for remediation of contaminated soil. Thus, contaminated soil would be required to be transported off site for treatment (one demonstration location identified is in New Jersey). Mobilization of a temporary onsite treatment facility is possible but has not been demonstrated in the literature and could pose numerous setup and startup difficulties. The technology requires a significant, reliable source of electrical power. The contaminated soil require size reduction before it is put in the furnace for vitrification. The system requires off-gas treatment system to address air emissions. Containment technologies required to protect receptors and the environment from release of LA fibers during initial processing of contaminated soil.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Effectiveness*	*Implementability*	*Relative Cost: Capital Cost*	*Relative Cost: O&M Cost*	*Reasons for Elimination of Process Option from Consideration*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
Treatment – Continued	Thermal Treatment – Continued	Plasma Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes to form plasma. Contaminated soil placed in the plasma arc form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	❺ Protects receptors by converting contaminated soil to an inert form. The treatment is irreversible. Once treated, the non-regulated material and soil can be used for site restoration. Must be combined with removal and transportation technologies.	❶ Implemented using a patented, demonstrated, and commercialized technology. Currently the technology is not available in the U.S. to treat large volumes of contaminated soil. The sole vendor available in the U.S. has commercial portable units, which can only treat very small volumes of contaminated soil. The technology requires a significant, reliable source of electrical power. The contaminated soil requires size reduction before it is put in the furnace for vitrification. The system also requires an off-gas treatment system. Containment technologies required to protect receptors and the environment from release of LA fibers during initial processing of contaminated soil.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
	Thermal/Chemical Treatment	Thermo-Caustic Dissolution	Contaminated soil would be placed into a high temperature caustic (strong basic) solution. Asbestos fibers are partially to fully converted (changed to an amorphous structure) during immersion. Partially converted asbestos fibers are further converted using chemical reactions to form a viscous mixture, which is later vitrified. The resulting reaction product (glass) is an amorphous inert waste.	❹ Protects receptors by converting contaminated soil to an inert form. The treatment is irreversible. Once treated, the non-regulated material and soil can be used for site restoration. Must be combined with removal and transport technologies.	❶ Implemented using a patented and demonstrated technology jointly developed by the U.S. Department of Energy (DOE) and their contractors for specialized use on DOE facilities. This technology is not commercially available. The high temperature caustic solution poses potential difficulties and risks to workers during the first stage of the process. The contaminated soil requires size reduction before it is put into the caustic solution. The vitrification portion of the technology requires a significant, reliable source of electrical power. The system also requires an off-gas treatment system. Containment technologies required to protect receptors and the environment from release of LA fibers during initial processing of contaminated soil.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
		Thermo-chemical Treatment	Contaminated soil would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. This process is similar to vitrification but does not involve complete melting. Instead, the process results in partial sintering of the material. The resulting reaction product (rock-like material) is an inert waste. TCCT, patented by ARI is a commercial form of this technology.	❹ Protects receptors by converting contaminated soil to an inert form. The treatment is irreversible. Once treated, the inert material and soil can be used for site restoration. Must be combined with removal and transport technologies. Offsite transportation of contaminated soil could negatively impact the community.	❸ Implemented using a patented, demonstrated, and commercialized technology (TCCT). Currently the contaminated soil would be required to be transported off site for treatment to the closest operating TCCT facility in Washington State. Mobilization of a temporary onsite treatment facility is possible but with high cost. The contaminated soil requires size reduction before it is put in the furnace for thermo-chemical conversion. The treatment process does not require physical separation/segregation of contaminated soil into similar materials and associated soil. Containment technologies required to protect receptors and the environment from release of asbestos fibers during implementation.	$$$$$	⓿	Retained	Viable as a long-term solution and meets NCP preference for innovative and demonstrated treatment technologies. Must be combined with contaminated soil removal and transport technologies.

Notes:

1. The screening process for effectiveness, implementability, and relative cost involves a qualitative assessment of the degree to which process options address evaluation criteria presented in Section 4.6. The numerical designations for the qualitative ratings system used in this table are not used to quantitatively assess process options (for instance, rankings for a process option are not additive).

2. Shading indicates remedial technologies/process options have been eliminated from further consideration based on lack of effectiveness, implementability, and/or cost. Remaining (unshaded) remedial technologies/process options have been retained for assembly into remedial action alternatives as discussed in Section 5.0.

Legend for Qualitative Ratings System: The following ratings were used for evaluation and presentation of effectiveness, implementability, and relative cost:

Effectiveness and Implementability		Relative Cost	
⓿	**None**	⓿	**None**
❶	**Low**	$	**Low**
❷	**Low to Moderate**	$$	**Low to Moderate**
❸	**Moderate**	$$$	**Moderate**
❹	**Moderate to High**	$$$$	**Moderate to High**
❺	**High**	$$$$$	**High**

Table 4-3
Retained Remedial Technologies/Process Options
Contaminated Soil

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
No Action	None	None	No action would be taken. Contaminated soil would remain in their existing conditions.	Required by NCP as stand-alone alternative.
Monitoring	Inspection	Non-Intrusive Visual Inspection	A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of contaminated soil.	Viable for short- and long-term site monitoring.
		Intrusive Visual Inspection	An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of contaminated soil.	Viable for short- and long-term site monitoring.
	Sampling and Analysis	Sample Collection and Microscopic Analysis	Air and/or soil samples would be collected for microscopic analysis in a laboratory to determine the potential presence of asbestos fibers. Types of samples collected include but are not limited to soil, ambient air, and ABS. Types of microscopic analyses include but are not limited to PLM, stereomicroscopy, and TEM.	Viable for short- and long-term site monitoring.
Institutional Controls	Land Use Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Contact with contaminated soil would be controlled through legal instruments. Examples of governmental (state or local) controls include but are not limited to zoning restrictions, ordinances, statutes, codes or regulations, building permits, or other provisions that restrict land or resource use at a site. Examples of proprietary controls include but are not limited to instruments such as easements and covenants, in the event that the city of Libby decides to transfer the property to a private ownership. Examples of informational devices include but are not limited to state registries of contaminated properties, deed notices, and advisories.	Potentially viable process option for combination with engineered controls or contaminated soil containment and/or disposal technologies in which wastes posing a threat to receptors are left on site.
	Community Awareness	Information and Education Programs	Community information and education programs would be undertaken to enhance awareness of potential hazards and remedies for contaminated soil.	Potentially viable process option for combination with all other technologies.
Engineered Controls	Access Restrictions	Fencing and Posted Warnings	Contaminated soil would be enclosed by fences and warning signs to control access by human receptors and some ecological receptors.	Potentially viable process option for combination with institutional controls or contaminated soil containment and/or disposal technologies in which wastes posing a threat to receptors are left on site.

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
Containment	Surface Source Controls	Water-Based Suppression	Contaminated soil would be kept "adequately wet" using water or a water-based dust suppressant to control airborne migration of asbestos fibers from contaminated soil to the surrounding environment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with contaminated soil removal, disposal, and/or treatment technologies.
		Chemical-Based Suppression	Contaminated soil would be treated with a resinous or petroleum-based chemical dust suppressant to control airborne migration of asbestos fibers from contaminated soil to the surrounding environment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with contaminated soil removal, disposal, and/or treatment technologies.
		Soil or Rock Exposure Barrier/Cover	Contaminated soil would be covered with a layer of clean soil or rock with sufficient thickness to eliminate exposure risks to receptors.	Viable as a long-term solution.
		Asphalt or Concrete Exposure Barrier/Cover	Contaminated soil would be covered with layers of asphalt or concrete with sufficient thickness to eliminate exposure risks to receptors.	Viable as a long-term solution.
		Geosynthetic Multi-Layer Exposure Barrier/Cover	Contaminated soil would be covered with geosynthetic material (such as geomembrane or a GCL) along with protective vegetative or rock layers to eliminate exposure risks to receptors.	Viable as a long-term solution.
Removal, Transport, Disposal	Removal	Mechanical Removal (Excavation)	Contaminated soil would be removed using mechanical excavation methods.	Viable as a long-term solution; must be combined with contaminated soil transport, disposal, and/or treatment technologies.
	Transport	Mechanical Transport (Hauling/Conveying)	Contaminated soil would be transported by truck or other mechanical conveyance method.	Viable as a long-term solution; must be combined with contaminated soil removal, disposal, and/or treatment technologies.
		Pneumatic Transport (Vacuum Truck/ Pumping)	Contaminated soil would be transported using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	Viable as a long-term solution; must be combined with contaminated soil removal, disposal, and/or treatment technologies.
	Disposal	Offsite Disposal	Removed contaminated soil would be disposed of at the Former Libby Asbestos Vermiculite Mine.	Viable as a long-term solution; must be combined with contaminated soil removal and transport technologies.

General Response Actions	***Remedial Technology***	***Process Option***	***Description of Option***	***Process Option Viability with Respect to Assembly of Remedial Alternatives***
Treatment	Thermal/Chemical Treatment	Thermo-chemical Treatment	Contaminated soil would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. This process is similar to vitrification but does not involve complete melting. Instead, the process results in partial sintering of the material. The resulting reaction product (rock-like material) is an inert waste. TCCT, patented by ARI is a commercial form of this technology.	Viable as a long-term solution and meets NCP preference for innovative and demonstrated treatment technologies. Must be combined with contaminated soil removal and transport technologies.

Note:

All remedial technologies/process options mentioned above have been retained for assembly into remedial action alternatives as discussed in Section 5.0.

Table 5-1
Remedial Technologies/Process Options Evaluated for Assembly Into Remedial Alternatives

General Response Actions	Remedial Technology	Process Option	Alternative 1	Alternative 2	Alternative 3a	Alternative 3b	Alternative 4	Alternative 5
No Action	None	None	✓					
Monitoring	Inspection	Non-Intrusive Visual Inspection	✓	✓	✓	✓	✓	✓
		Intrusive Visual Inspection		✓	✓	✓	✓	✓
	Sampling and Analysis	Sample Collection and Microscopic Analysis		✓	✓	✓	✓	✓
Institutional Controls	Land Use Controls	Governmental Controls, Proprietary Controls, and Informational Devices		✓	✓	✓	✓	✓
	Community Awareness	Information and Education Programs		✓	✓	✓	✓	✓
Engineered Controls	Access Restrictions	Fencing and Posted Warnings		✓	✓	✓	✓	✓
Containment	Surface Source Controls	Water-Based Suppression			✓	✓	✓	✓
		Chemical-Based Suppression			✓	✓	✓	✓
		Soil or Rock Exposure Barrier/Cover			✓	✓		
		Asphalt or Concrete Exposure Barrier/Cover			✓	✓		
		Geosynthetic Multi-Layer Exposure Barrier/Cover			✓	✓		
Removal, Transport, Disposal	Removal	Mechanical Removal (Excavation)				✓	✓	✓
	Transport	Mechanical Transport (Hauling/Conveying)				✓	✓	✓
		Pneumatic Transport (Vacuum Truck/ Pumping)				✓	✓	✓
	Disposal	Offsite Disposal				✓	✓	
Treatment	Thermal/Chemical Treatment	Thermo-chemical Treatment						✓

Notes:

1. Check mark designations indicate that remedial technology/process option could be evaluated as a potential component of the indicated remedial alternative.
2. Shaded boxes indicate the process options are not considered for the remedial alternative(s) in question.
3. Where similar process options have been indicated for the same remedial alternative (such as mechanical transport versus pneumatic transport), the most representative process has been selected for evaluation and costing. However that does not preclude use of the similar alternate processes during implementation of the selected remedy.
4. Descriptions of remedial technologies/process options are provided in Table 4-3. Descriptions of remedial alternatives are provided in Section 5.3.

Alternative 1:	No Action
Alternative 2:	Institutional and Engineered Controls with Monitoring
Alternative 3a:	In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring
Alternative 3b:	In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring
Alternative 4:	Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring
Alternative 5:	Removal of Contaminated Soil within the Flyway Subarea, Offsite Thermo-Chemical Treatment and Reuse of Treated Material, Institutional and Engineered Controls with Monitoring

Figures

Legend

- OU1 - Former Export Plant
- OU2 - Former Screening Plant, Flyway Property, Highway 37 right-of-way adjacent to the Screeing Plant, and the KDC Bluffs
- OU3 - Mine site area, Kootenai River, Rainy Creek and Rainy Creek Road
- OU4 - Residential, Commercial, Industrial Properties including Schools and Parks
- OU5 - Former Stimson Lumber Mill
- OU6 - BNSF Railyard, Tracks, and Right -of-way
- OU7 - Troy

N
W E
S

Feet
0 5,000 10,000 20,000

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Montana FIPS

Data Source(s):
See Note on Map

This product is for information purposes and may not have been prepared for legal, engineering or surveying purposes. Users of this infomration should review or consult the primary data and information source to ascertain the usability of this information.

The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of March 2009.

Figure 1-1

Operable Unit (OU) Boundaries
Libby Asbestos Site
Libby, Montana

CDM

Legend

- OU2 Boundary
- 1- Former Screening Plant
- 2 - Flyway
- 3 - Private Property
- 4 - Rainy Creek Road Frontage

N
W E
S

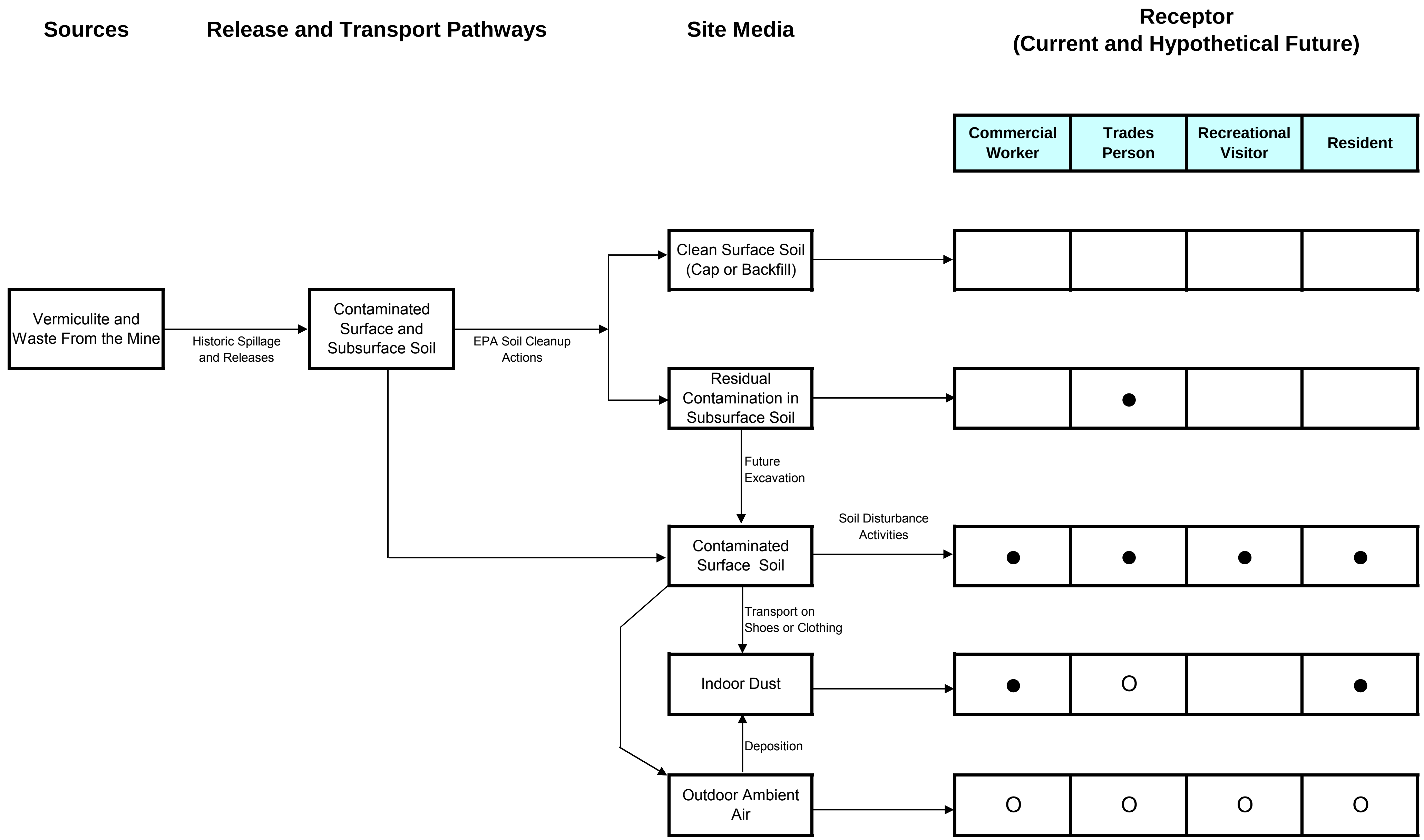
Feet
0 250 500 1,000

Figure 1-2
Operable Unit 2
Site Map

Libby Asbestos Site
Lincoln County, Montana

CDM

Libby Superfund Site -- Operable Unit 2
Former Screening Plant (Subarea 1), Flyway (Subarea 2), Private Property (Subarea 3),and Rainy Creek Road Frontage (Subarea 4)



Site Media	Commercial Worker	Trades Person	Recreational Visitor	Resident
Clean Surface Soil (Cap or Backfill)				
Residual Contamination in Subsurface Soil		●		
Contaminated Surface Soil	●	●	●	●
Indoor Dust	●	O		●
Outdoor Ambient Air	O	O	O	O

KEY

- ● Pathway is or may become complete and exposure may be significant
- O Pathway is or may become complete, but exposure is expected to be minor
- (empty box) Pathway is incomplete or negligible

Figure 2-1

Conceptual Site Model for Current and Future Inhalation Exposures to Asbestos at OU2

Operable Unit 2 (OU2)

Libby Asbestos Site, Lincoln County, Libby, Montana

CDM

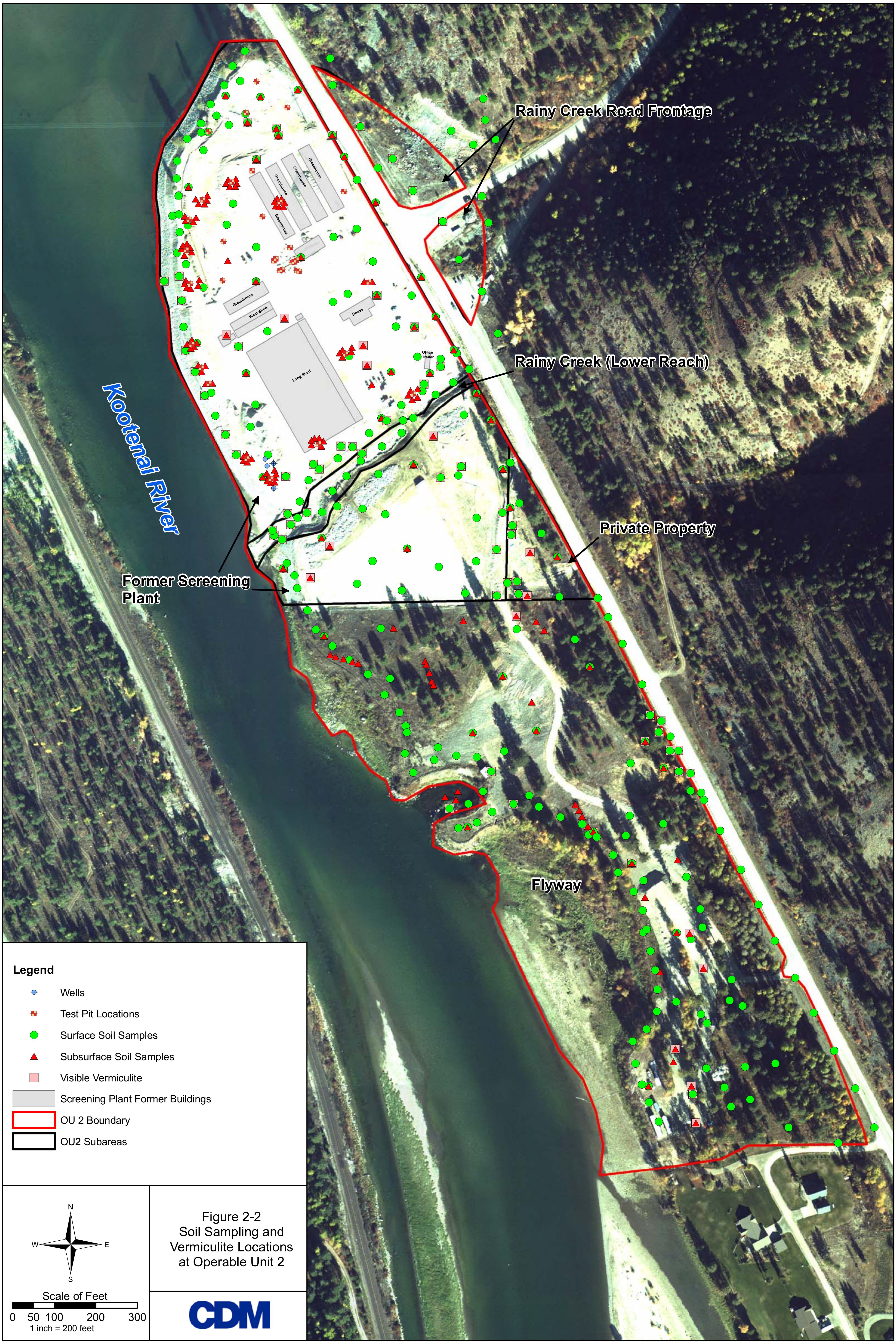


Figure 2-2
Soil Sampling and Vermiculite Locations at Operable Unit 2

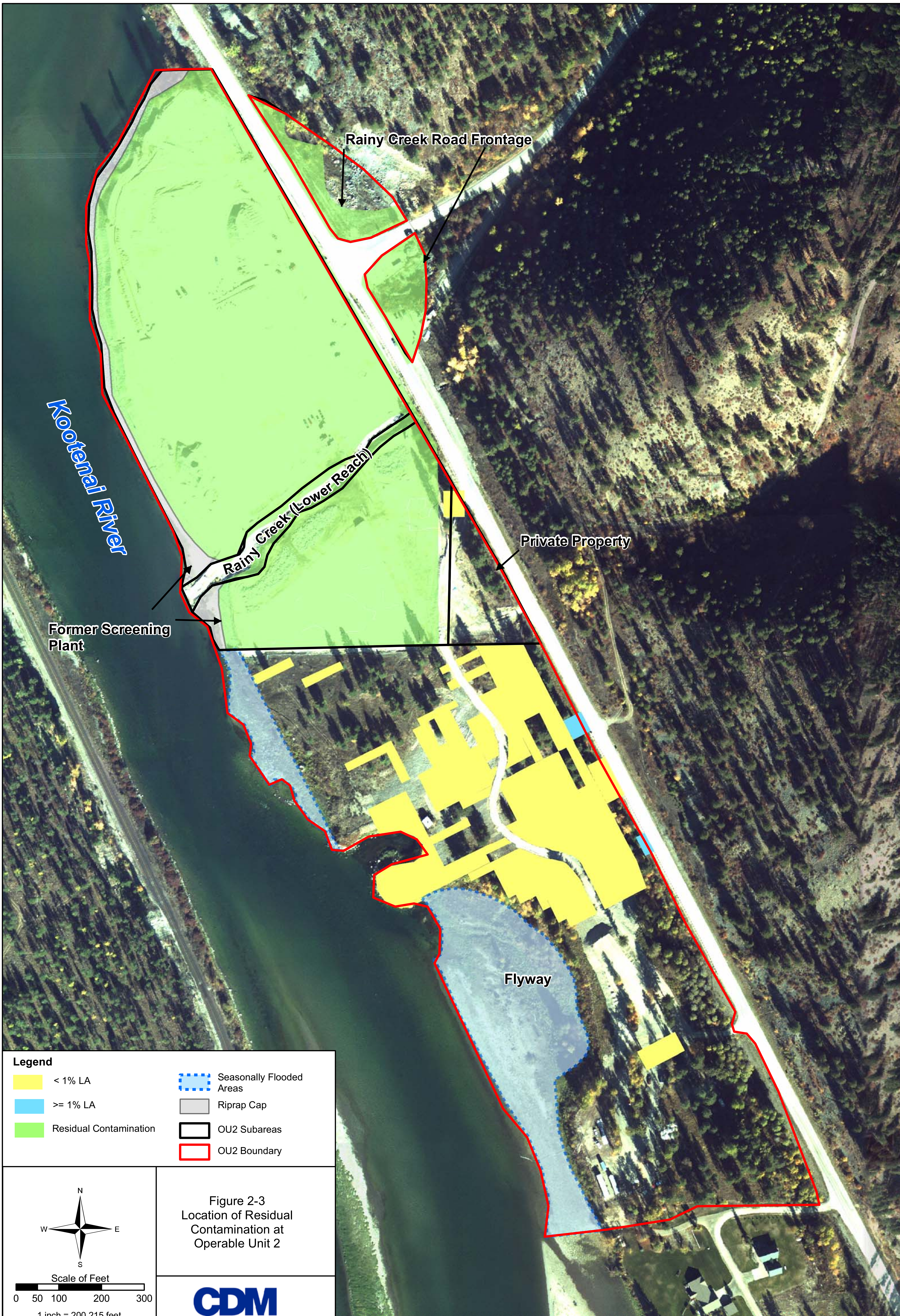


Figure 2-3
Location of Residual Contamination at Operable Unit 2

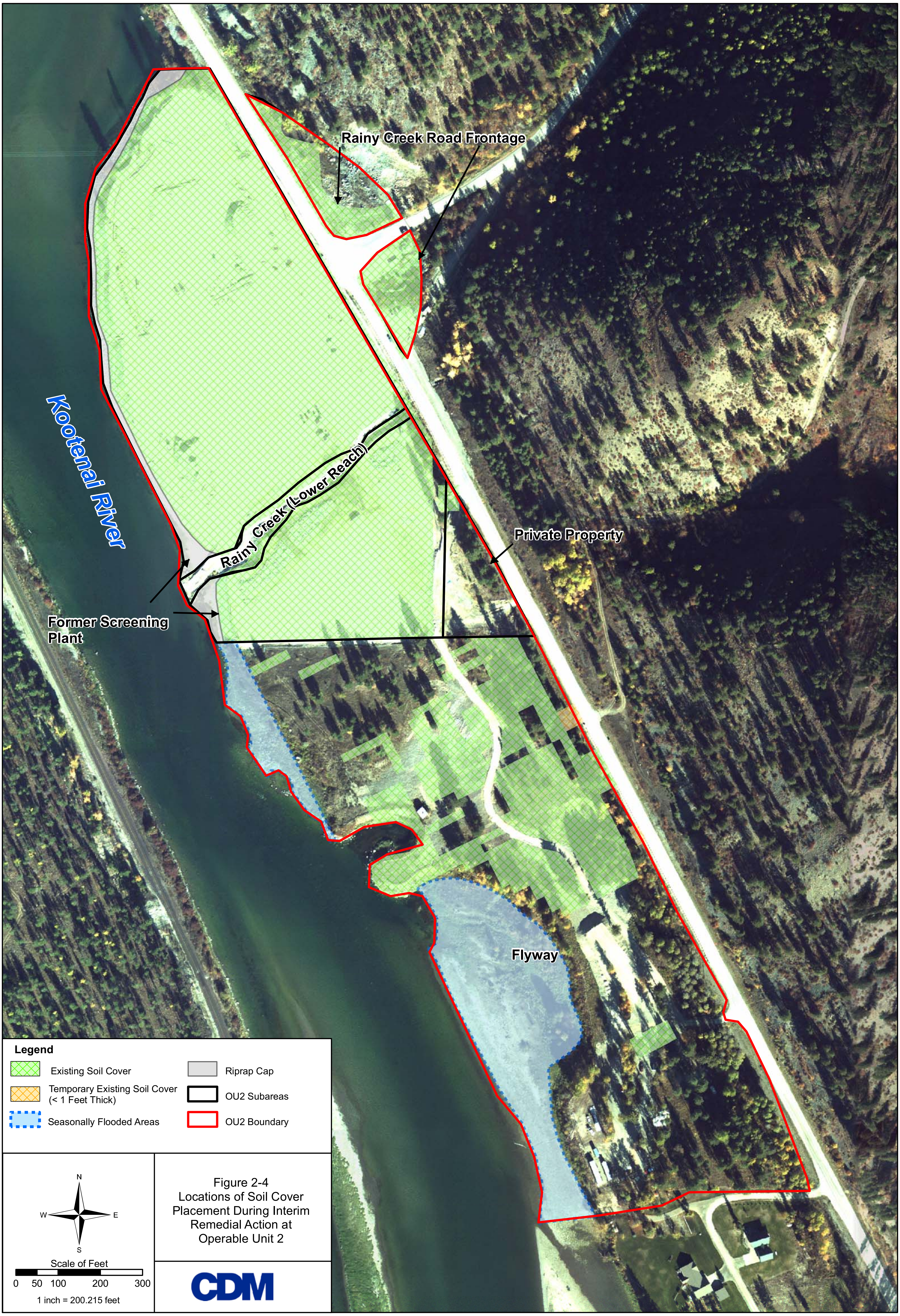


Figure 2-4
Locations of Soil Cover Placement During Interim Remedial Action at Operable Unit 2

Figure 7-1
Alternative 2
Conceptual Remedial Configuration
Operable Unit 2

Figure 7-2
Alternative 3a
Conceptual Remedial Configuration
Operable Unit 2

Rainy Creek Road Frontage
Kootenai River
Rainy Creek (Lower Reach)
Private Property
Former Screening Plant
Flyway
Legend
Asbestos Warning Signs
Excavation/Backfill Area
Fencing
Riprap Cap
Protective Cover
OU2 Subareas
Seasonally Flooded Areas
OU2 Boundary
Note: Configuration of new remedial components such as fencing, warning signs, cover and excavation areas are conceptual for FS evaluation purposes. Actual configurations of these components will be determined during remedial design.
N
W
E
S
Scale of Feet
0 50 100 200 300
1 inch = 200 feet
Figure 7-3
Alternative 3b
Conceptual Remedial Configuration
Operable Unit 2
CDM

Appendix A

Summary of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs)

Summary of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) Compliance
OU2 - Former Screening Plant Site, Libby

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
Federal ARARs						
National Historic Preservation Act (NHPA), 16 U.S.C. § 470 40 CFR 6.301(b) 36 CFR 60, 63, 800	Applicable	This statute and implementing regulations require federal agencies to take into account the effect of this response action upon any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places.	If cultural resources on or eligible for the national register are present, it will be necessary to determine if there will be an adverse effect and if so how the effect may be minimized or mitigated. The unauthorized removal of archaeological resources from public or Indian lands is prohibited without a permit, and any archaeological investigations at a site must be conducted by a professional archaeologist. If any remedial action activities are necessary beyond permitted, SHPO consultation and NHPA compliance will be addressed during remedial design.		✓	
Archaeological and Historic Preservation Act 16 U.S.C. § 469 40 CFR 6.301(c) 43 CFR 7	Applicable	This statute and implementing regulations establish requirements for the evaluation and preservation of historical and archaeological data, which may be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.			✓	
Fish and Wildlife Coordination Act 16 U.S.C. §§ 661, et seq., 40 CFR 6.302(g) 50 CFR 83 33 CFR 320-330	Applicable	This statute and implementing regulations require coordination with federal and state agencies for federally funded projects to ensure that any modification of any stream or other water body affected by any action authorized or funded by the federal agency provides for adequate protection of fish and wildlife resources.	If the remedial action involves activities that affect wildlife and/or non-game fish, federal agencies must first consult with the U.S. Fish and Wildlife Service and the relevant state agency with jurisdiction over wildlife resources.		✓	
Endangered Species Act, 16 U.S.C. § 1531 40 CFR 6.302(h) 50 CFR 17 and 402	Relevant and Appropriate	This statute and implementing regulations provide that federal activities not jeopardize the continued existence of any threatened or endangered species. Endangered Species Act, Section 7 requires consultation with the U.S. Fish and Wildlife Service to identify the possible presence of protected species and mitigate potential impacts on such species.	If threatened or endangered species are identified within the remedial areas, activities must be designed to conserve the species and their habitat. To date no threatened or endangered species have been identified in the area of the site.		✓	

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
Federal ARARs						
Migratory Bird Treaty Act, 16 U.S.C. §§ 703, et seq. 50 CFR 10.13	Relevant and Appropriate	This requirement establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation with the U.S. Fish and Wildlife Service during remedial design and remedial construction to ensure that the cleanup of the site does not unnecessarily impact migratory birds.	The selected remedial actions will be carried out in a manner to avoid adversely affecting migratory bird species, bald eagle and including individual birds or their nests.		✓	
Clean Air Act (CAA) Air Cleaning 40 CFR 61.152 Note: Section 61.152(b)(3) is not delegated to the State	Relevant and Appropriate	This requirement establishes detailed specifications for air cleaning used as part of a system to control asbestos emissions control system.	These requirements would be applicable if air cleaning is part of the building demolitions. It would be relevant and appropriate to other air cleaning operations.	✓		✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.155	Relevant and Appropriate	This requirement establishes detailed standards for operations that convert asbestos containing waste material into non-asbestos (asbestos-free) material.	These requirements would be applicable if the remedial action includes any treatment of asbestos containing material.	✓		✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.145 (c) & (d)	Relevant and Appropriate	This requirement establishes detailed standards and specifications for demolition and renovation. The regulation provides detailed procedures for controlling asbestos release during demolition of a building containing "regulated-asbestos containing material (RACM)".	Applicable to building demolitions that will occur as part of the removal if certain threshold volumes of RACM are disturbed. The dust control portions of the regulations are relevant and appropriate for soil disturbance activities and for asbestos contaminated material that does not meet the strict definition of RACM.			✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.149 Note: Section 61.149(c)(2) is not delegated to the State	Relevant and Appropriate	This Act and implementing regulations, 40 CFR 61.149, establish detailed procedures and specifications for handling and disposal of asbestos containing waste material generated by an asbestos mill.	Requirements under this regulation are considered relevant and appropriate to the ACM disposal. It is not applicable because the facilities do not meet the regulatory definition of an asbestos mill.			✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.150 Note: Section 61.150(a)(4) is not delegated to the State	Relevant and Appropriate	Standard for waste disposal for manufacturing, fabricating, demolition, renovation and spraying operations. This regulation provides detailed procedures for processing, handling and transporting asbestos containing waste material generated during building demolition and renovation (among other sources).	Applicable to RACM generated by building demolitions that will occur as part of the remedial action. Relevant and appropriate for soil disturbance activities and for asbestos contaminated material that does not meet the strict definition of RACM.			✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
Federal ARARs						
Clean Air Act (CAA) Air Cleaning 40 CFR 61.151 Note: Section 61.151(c) is not delegated to the State	Relevant and Appropriate	Standard for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations. Provides requirements for covering, revegetation and signage at facilities where RACM will be left in place.	Requirements under this regulation are considered relevant and appropriate to asbestos containing soils and/or debris left in place. It is not applicable because the facilities that are part of this remedial do not meet the facility definitions in the regulation.			✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.154 Note: Section 61.154(d) is not delegated to the State	Other Requirements	Standard for active waste disposal sites. Provides requirements for off-site disposal sites receiving asbestos-containing waste material from building demolitions and other specific sources.				✓
Toxic Substances Control Act (TSCA) 40 CFR Part 763, Subpart G (implemented by the State under the Montana Asbestos Control Act)	Other Requirements	Asbestos abatement projects and asbestos worker protection. This subpart protects certain State and local government employees who are not protected by the Asbestos Standards of the Occupational Safety and Health Administration (OSHA). This subpart applies the OSHA Asbestos Standards in 29 CFR 1910.1001 and 29 CFR 1926.1101 to these employees.	The State requires that work be performed in accordance with 40 CFR 763.120 and 763.121 (asbestos abatement projects) and 29 CFR 1926.58 (asbestos standard for the construction industry). These requirements will be incorporated into the health & safety plan but do not meet the definition of an ARAR.			✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Montana Asbestos Control Act ARM 17.8.204 ARM 17.8.206	Relevant and Appropriate	Ambient Air Monitoring & Ambient Air Methods and Data: Require that all ambient air monitoring, sampling and data collection, recording, analysis and transmittal shall be in compliance with the Montana Quality Assurance Manual except when more stringent requirements are determined to be necessary.	These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.	✓		
Montana Asbestos Control Act ARM 17.8.220 ARM 17.8.223	Applicable	Ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the following 30-day average: 10 grams per square meter. Ambient air quality standards for PM-10. PM-10 concentrations in the ambient air shall not exceed the following standards: 150 micrograms/cubic meter of air, 24-hour average; and 50 micrograms/cubic meter of air, expected annual average.	The removal action will involve significant soil disturbance. Particulate/dust levels will need to be controlled. Each of the ambient air quality standards includes specific requirements and methodologies for monitoring and detection. These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.	✓		✓
Montana Asbestos Control Act ARM 17.8.304	Applicable	Visible Air Contaminants. No source may discharge emissions into the atmosphere that exhibit opacity of 20 percent or greater, averaged over six consecutive minutes. This standard is limited to point sources, but excludes wood waste burners, incinerators, and motor vehicles.	No visible emissions are anticipated.	✓		✓
Montana Asbestos Control Act ARM 17.8.308	Applicable	Airborne Particulate Matter. Emissions of airborne particulate matter from any stationary source shall not exhibit opacity of 20 percent or greater, averaged over six consecutive minutes.	This standard applies to the production, handling, transportation, or storage of any material; to the use of streets, roads, or parking lots; and to construction or demolition projects.	✓		✓
Montana Asbestos Control Act ARM 17.8.315	Relevant and Appropriate	Odors. If a business or other activity will create odors, those odors must be controlled, and no business or activity may cause a public nuisance.	Action is not expected to produce nuisance level odors.	✓		

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Montana Water Quality Control Act ARM 17.30.637	Applicable	It states that no waste may be discharged and no activities conducted which, either alone or in combination with other waste activities, will cause violation of surface water quality standards; provided a short term exemption from a surface water quality standard may be authorized by the department for “emergency remediation activities” under the conditions specified in § 75-5-308, MCA.		✓		
Montana Water Quality Control Act ARM 17.30.705	Applicable	Requires that for any surface water, existing and anticipated uses and the water quality necessary to protect these uses must be maintained and protected unless degradation is allowed under the nondegradation rules at ARM 17.30.708.		✓		
Montana Asbestos Control Act ARM 17.74.301 et seq., MCA 75-2-501 et seq.	Applicable	The Montana Asbestos Control Act, and implementing rules establish standards and procedures for accreditation of asbestos-related occupations and control of the work performed by persons in asbestos-related occupations.	The Montana Asbestos Control Act, and implementing rules establish standards and procedures for accreditation of asbestos-related occupations and control of the work performed by persons in asbestos-related occupations.			✓
Montana Asbestos Control Act ARM 17.74.308	Applicable	Establishes air monitoring requirements for asbestos abatement projects, including for building clearance after abatement.	These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.			✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Montana Asbestos Control Act ARM 17.74.335	Applicable	Asbestos abatement project permits. Asbestos abatement projects require a permit from DEQ. The permit conditions include but are not limited to: (a). A requirement that all work performed be in accordance with 29 CFR Section 1926.58 (asbestos standards for the construction industry); and 40 CFR Section 763.120, 121 (requirements for asbestos abatement projects). (b). A requirement that all asbestos be properly disposed in an approved asbestos disposal facility. "Approved asbestos disposal facility" is defined at ARM 17.54.302(1) as a properly operated and licensed class II landfill as described in ARM 17.50.504. (c). A requirement that asbestos be disposed in accordance with 40 CFR Part 61, Subpart M (National Emission Standard for Asbestos). <u>See</u> discussion above on National Emission Standard for Asbestos.	Applicable to work meeting the definition of RACM. Relevant and Appropriate for soils or contaminated material that does not meet the strict definition of RACM. The substantive requirements for performance of the work and proper disposal and will be met by the contractors used. On-site CERCLA actions do not require a permit.			✓
Montana Asbestos Control Act ARM 17.74.351 ARM 17.74.365	Applicable	Adopts and incorporates by reference 40 CFR subparts A and M (NESHAP) for asbestos, and the National Institute of Occupational Safety and Health (NIOSH) Manual of Analytical Methods for detecting asbestos by phase contrast microscopy (PCM) and a description of the 7402 Analytical Method for detecting asbestos by transmission electron microscopy (TEM). It requires that training for asbestos workers, supervisors, inspectors, project management planners, and project designers meet requirements of 40 CFR 763, subpart E, Appendix C (Asbestos Model Accreditation Plan).		✓		✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
The Montana Asbestos Control Manual	Applicable	The Montana Asbestos Control Manual (the Manual) is adopted and incorporated by reference in ARM Title 17, Chapter 74, Subchapter 3. The Manual identifies practices and procedures for inspecting for asbestos, conducting asbestos projects, and clearing asbestos projects. The Montana Department of Environmental Quality administers NESHAP through its asbestos control program. The NESHAP contains standards that regulate building demolitions, renovations, asbestos disposal sites, and other sources of asbestos emissions.		✓		✓
The Natural Streambed and Land Preservation Act of 1975 ARM 36.2.410 et seq., MCA 75-7-101 et seq.	Relevant and Appropriate	Establishes minimum standards if a project alters or affects a streambed, including any channel change, new diversion, riprap or other stream-bank protection project, jetty, new dam or reservoir or other commercial, industrial or residential development.	The removal actions may require stream-bank protection. If so, the substantive portions of these requirements would be applicable.			✓
Montana Code Annotated (MCA), Montana Floodplain and Floodway Management Act and Regulations , ARM 36.15.601 et seq. MCA 76-5-401 et seq.	Relevant and Appropriate	The Floodplain and Floodway Management Act and regulations specify types of uses and structures that are allowed or prohibited in the designated 100-year floodway and floodplain. Libby OU2 is adjacent to the Kootenai River, and these standards are relevant to all actions within the floodplain.	According to the National Flood Insurance Program, Floodway Boundary and Floodway Map, the Former Export Plant property is outside the 100 year flood plain. The Screening Plant, which is at a higher elevation is also presumed to be outside the 100 year flood plain. No solid waste disposal will occur within the floodway or floodplain.		✓	
Floodplain and Floodway Management Act ARM 36.15.602(5), ARM 36.15.605, ARM 36.15.703	Relevant and Appropriate	Solid and hazardous waste disposal and storage of toxic, flammable, hazardous or explosive materials are prohibited anywhere in floodways or floodplains.				

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Floodplain and Floodway Management Act ARM 36.15.701 ARM 36.15.702(2)	Relevant and Appropriate	In the flood fringe (i.e., within the floodplain but outside the floodway), residential, commercial, industrial, and other structures may be permitted subject to certain conditions relating to placement of fill, roads, and flood proofing. Standards for residential, commercial or industrial structures are found in ARM 36.15.702(2).				
Montana Code Annotated (MCA), Montana Antiquities Act, MCA 22-3-421, et seq.	Relevant and Appropriate	Montana Antiquities Act addresses the responsibilities of State agencies regarding historic and prehistoric sites including buildings, structures, paleontological sites, archaeological sites on state owned lands. Each State agency is responsible for establishing rules regarding historic resources under their jurisdiction which address National Register eligibility, appropriate permitting procedures and other historic preservation goals. The State Historic Preservation Office maintains information related to the responsibilities of State Agencies under the Antiquities Act.			✓	
Montana Code Annotated (MCA), Montana Human Skeletal Remains and Burial Site Protection Act (1991), MCA 22-3-801 et seq.	Applicable	The Human Skeletal Remains and Burial Site Protection Act is the result of years of work by Montana Tribes, State agencies and organizations interested in ensuring that all graves within the State of Montana are adequately protected. If human skeletal remains or burial sites are encountered during remedial activities within OU2 of the Libby Asbestos Site, then these requirements will be applicable.			✓	

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Montana Code Annotated (MCA) MCA 50-64-104 MCA 50-64-104 (7)	Applicable	This section provides for various safeguards to prevent release of asbestos into the air during demolition. The prescribed safeguards include notification of the local fire department, posting of warning signs, wetting of surfaces, dust emission control, covering and wetting during transport, and depositing where materials are unlikely to be disturbed. Requires prevention of asbestos dust dispersion during transportation by requiring debris to be covered, enclosed and wetted.	These standards are applicable to building demolition and relevant and appropriate to other removal activities.			✓
Montana Code Annotated (MCA), Local Air Pollution Control Program MCA 75-3-301	Applicable	The provisions of the Lincoln County Air Pollution Control Program, approved by Montana DEQ pursuant to § 75-2-301, MCA and administered by Lincoln County, are designed to regulate activities within a designated Air Pollution Control District to achieve and maintain such levels of air quality as will protect human health and safety and, to the greatest degree practicable, prevent injury to plant and animal life and property, and facilitate the enjoyment of the natural attractions of Lincoln County.			✓	✓
Montana Code Annotated (MCA) MCA 75-5-605	Applicable	Prohibits the causing of pollution of any state waters. Section 75-5-103(21)(a)(i) defines pollution as contamination or other alteration of physical, chemical, or biological properties of state waters which exceeds that permitted by the water quality standards. States that it is unlawful to place or cause to be placed any wastes where they will cause pollution of any state waters. Any permitted placement of waste is not placement if the agency's permitting authority contains provisions for review of the placement of materials to ensure it will not cause pollution to state waters.	These requirements would be triggered only in the event that the removal action impacts surface of groundwater. Excavation may take place close to the Kootenai River. Precautions will need to be put into place to prevent accidental release of asbestos containing soils into the river. May also be applicable if disposal of RACM occurs on-site.		✓	

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Montana Code Annotated (MCA) MCA 87-5-502 and 504	Applicable	Provide that a state agency or subdivision shall not construct, modify, operate, maintain or fail to maintain any construction project or hydraulic project which may or will obstruct, damage, diminish, destroy, change, modify, or vary the natural existing shape and form of any stream or its banks or tributaries in a manner that will adversely affect any fish or game habitat. The requirement that any such project must eliminate or diminish any adverse effect on fish or game habitat is applicable to the state in approving remedial actions to be conducted. The Natural Streambed and Land Preservation Act of 1975, MCA § 75-7-101, et seq., (Applicable -- substantive provisions only) includes similar requirements and is applicable to private parties as well as government agencies.	Consultation with the Montana Department of Fish, Wildlife and Parks, and any conservation district or board of county commissioners (or consolidated city/county government) is encouraged during the designing and implementing of the remedial action for OU2 of the Libby Asbestos Site.		✓	
Occupational Health Act ARM 17.74.101 ARM 17.74.102 MCA 50-70-101 et seq.,	Other Requirements	ARM §17.74.101, along with the similar Federal standard in 29 CFR §1910.95, addresses occupational noise. ARM § 17.74.102, along with the similar federal standard in 29 CFR §1910.1000 addresses occupational air contaminants.	These requirements **will be** addressed as part of the Health & Safety Plan and do not meet the definition of an ARAR.			✓
Montana Safety Act. Montana Code Annotated (MCA) MCA 50-71-201, 202 and 203	Other Requirements	These provisions state that every employer must provide and maintain a safe place of employment, provide and require use of safety devices and safeguards, and ensure that operations and processes are reasonably adequate to render the place of employment safe. The employer must also do every other thing reasonably necessary to protect the life and safety of its employees. Employees are prohibited from refusing to use or interfering with the use of safety devices.				✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Employee and Community Hazardous Chemical Information Act MCA 50-78-201, MCA 50-78-202, MCA 50-78-204	Other Requirements	State that each employer must post notice of employee rights, maintain at the work place a list of chemical names of each chemical in the work place, and indicate the work area where the chemical is stored or used. Employees must be informed of the chemicals at the work place and trained in the proper handling of the chemicals.	These requirements **will be** addressed as part of the Health & Safety Plan and do not meet the definition of an ARAR.			✓

Acronyms

ARAR	Applicable or Relevant and Appropriate Requirements
ARM	Administrative Rules of Montana
BMP	Best Management Practices
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
MCA	Montana Code Annotated
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NCRS	Natural Resources Conservation Service
OSHA	Occupational Safety and Health Administration
RACM	Regulated Asbestos Containing Material
RCRA	Resource Conservation and Recovery Act
SHPO	State Historic Preservation Office
TSCA	Toxic Substances Control Act
U.S.C	United States Code

Appendix B

Alternative Quantity Calculations

Alternative Screening

Libby OU2 - Former Screening Plant Site
Unit Quantities for Alternative Screening

TABLE B-1

Alternative 2	
Total Length to be Fenced	**Area (FT)**
Perimeter Length - North Seasonally Flooded Area	1,210
Perimeter Length - South Seasonally Flooded Area	2,120
Total Perimeter Length	**3,330**

TABLE B-2

Alternative 3a			
Total Area to be Covered	**Area (SF)**	**Area (SY)**	**Area (ACR)**
Area within West Embankments of Highway 37	5,000	556	0.20
Area Surrounding Sample 1-03000	10,000	1,112	0.30
Total Surface Area to be Covered - OU2	**15,000**	**1,668**	**0.50**
In-Place Containment/Cover	**Volume (BCF)**	**Volume (BCY)**	**Volume (LCY)**
Common Backfill Required:	15,000	556	640
Topsoil Required:	7,500	278	320
Total Soil Required:	**22,500**	**840**	**960**
Total Length of Fence Required:	**Linear Feet (LF)**		
Total Length of Chainlink Fence	**3,330**		

TABLE B-3

Alternative 3b			
Total Area to be Covered	**Area (SF)**	**Area (SY)**	**Area (ACR)**
Area within West Embankments of Highway 37	5,000	556	0.20
Total Surface Area to be Covered - OU2	**5,000**	**556**	**0.20**
Total Area to be Excavated	**Area (SF)**	**Area (SY)**	**Area (ACR)**
Area Surrounding Sample 1-03000	10,000	1,112	0.30
Total Surface Area to be Excavated - OU2	**10,000**	**1,112**	**0.30**
Soil Cover and Excavation Backfill	**Volume (BCF)**	**Volume (BCY)**	**Volume (LCY)**
Common Backfill Required:	10,000	371	427
Topsoil Required:	7,500	278	320
Total Soil Required:	**17,500**	**650**	**750**
Total Length of Fence Required:	**Linear Feet (LF)**		
Total Length of Chainlink Fence	**3,330**		

TABLE B-4

Alternative 4			
Total Area to be Excavated	**Area (SF)**	**Area (SY)**	**Area (ACR)**
Area within West Embankments of Highway 37	5,000	556	0.20
Area Surrounding Sample 1-03000	10,000	1,112	0.30
Total Surface Area to be Excavated - OU2	**15,000**	**1,668**	**0.50**
Excavated Area	**Volume (BCF)**	**Volume (BCY)**	**Volume (LCY)**
Common Backfill Required:	7,500	278	320
Topsoil Required:	7,500	278	320
Total Volume of Soil Required:	**15,000**	**560**	**640**
Total Volume of Excavated Soil:	**15,000**	**560**	**640**
Total Length of Fence Required:	**Linear Feet (LF)**		
Total Length of Chainlink Fence	**3,330**		

Libby OU2 - Former Screening Plant Site
Unit Quantities for Alternative Screening

TABLE B-5

Alternative 5			
Total Area to be Excavated	**Area (SF)**	**Area (SY)**	**Area (ACR)**
Area within West Embankments of Highway 37	5,000	556	0.20
Area Surrounding Sample 1-03000	10,000	1,112	0.30
Total Surface Area to be Excavated - OU2	**15,000**	**1,668**	**0.50**
Excavated Area	**Volume (BCF)**	**Volume (BCY)**	**Volume (LCY)**
Common Backfill Required:	7,500	278	320
Topsoil Required:	7,500	278	320
Total Volume of Soil Required:	**15,000**	**560**	**640**
Total Volume of Excavated Soil:	**15,000**	**560**	**640**
Total Weight of Excavated Soil:	**1.21 TN/CY**		**775**
Total Length of Fence Required:	**Linear Feet (LF)**		
Total Length of Chainlink Fence	**3,330**		

Note:
All totals are rounded-up to the nearest 10.

Detailed Analysis of Alternatives

TABLE B-6

Alternative 2
Calculation Worksheet
Required Materials Calculations

COST WORKSHEET

Site:	OU2 - Former Screening Plant	**Prepared By:** AS	**Date:** 8/19/2009
Location:	Libby, Montana		
Phase:	Final Feasibility Study	**Checked By:** GH	**Date:** 8/20/2009
Base Year:	2009		

Work Statement:
The spreadsheet also allow the user to change the quantities of site construction. Changes to the input fields on this calculation sheet will also change the quantities of engineered control and other site construction and the resulting capital costs.

Total Surface Area Covered	Area (SF)	Area (SY)	Area (ACR)
Area Covered During Interim Remedial Action	833,000	92,556	19.20
Total Surface Area Covered - OU2	833,000	92,556	19.20

Estimated Duration of the Project		
Number of Years to Complete:	0.09	years
Number of Months (April 1 to Nov 30):	0.66	months
4 Days off per month in 30 days months:	26	per month
Number of working days (200 LF/day)	17	days
Total number of working days:	17	days

Engineered Controls	Area (SF)
Total Length of Chainlink Fence Required (LF)	3,330
Total Number of Warning Sings Required (EA)	11

Description	Ratio/Factors
Expansion Factor	1.15
Fence - LF/Day	200

Notes:
Input fields are denoted by a dashed line. Do not overwrite information not contained within the dashed lines.

TABLE B-7

Alternative 3a
Calculation Worksheet
Required Materials Calculations

COST WORKSHEET

Site:	OU2 - Former Screening Plant	**Prepared By:** AS	**Date:** 8/19/2009
Location:	Libby, Montana		
Phase:	Final Feasibility Study	**Checked By:** GH	**Date:** 8/20/2009
Base Year:	2009		

Work Statement:
The spreadsheet also allow the user to change the quantities of earthwork, engineered controls and period of construction. Changes to the input fields on this calculation sheet will also change the quantities of soil, cover construction and the resulting capital costs.

Total Surface Area to be Covered	Area (SF)	Area (SY)	Area (ACR)
Area within West Embankments of Highway 37	5,000	556	0.20
Area Surrounding Sample 1-03000	10,000	1,112	0.30
Total Surface Area to be Covered - OU2	15,000	1,668	0.50

In-Place Containment/Cover	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required:	22,500	834	960
Total Common Backfill Required:	15,000	556	640
Total Topsoil Required:	7,500	278	320

Number Borrow Area Samples (1/10,000 CY)
1

Total Surface Area Covered During Interim Action	Area (SF)	Area (SY)	Area (ACR)
Total Surface Area Covered - OU2	833,000	92,556	19.20

Estimated Duration of the Project		
Number of Years to Complete:	0.09	years
Number of Months (April 1 to Nov 30):	0.66	months
4 Days off per month in 30 days months:	26	per month
Number of working days (200 lf/day)	17	days
Total number of working days:	17	days

Notes:
Based on the above mentioned assumptions; duration for cover construction would require 10 days and construction of engineered controls would require 17 days. Thus the overall project duration is based on the duration for engineered control construction.

Engineered Controls	Area (SF)
Length of Chainlink Fence Required (LF)	3,330
Number of Warning Sings Required (EA)	11

Cover System	Feet
Thickness of Subsoil	1.0
Thickness of Topsoil	0.5

Description	Ratio/Factors
Expansion Factor	1.15
Fence - LF/Day	200
Cover - CY/Day	100

Notes:
Input fields are denoted by a dashed line. Do not overwrite information not contained within the dashed lines.

TABLE B-8

Alternative 3b
Calculation Worksheet
Required Materials Calculations

COST WORKSHEET

Site:	OU2 - Former Screening Plant	**Prepared By:** AS	**Date:** 8/19/2009
Location:	Libby, Montana		
Phase:	Final Feasibility Study	**Checked By:** GH	**Date:** 8/20/2009
Base Year:	2009		

Work Statement:
The spreadsheet also allow the user to change the quantities of earthwork, engineered controls and period of construction. Changes to the input fields on this calculation sheet will also change the quantities of soil, cover construction and the resulting capital costs.

Total Surface Area Covered During Interim Action	Area (SF)	Area (SY)	Area (ACR)
Total Surface Area Covered - OU2	833,000	92,556	19.20

Total Surface Area to be Covered	Area (SF)	Area (SY)	Area (ACR)
Area within West Embankments of Highway 37	5,000	556	0.20
Total Surface Area to be Covered - OU2	5,000	556	0.20

Total Surface Area to be Excavated	Area (SF)	Area (SY)	Area (ACR)
Area Surrounding Sample 1-03000	10,000	1,112	0.30
Total Surface Area to be Excavated - OU2	10,000	1,112	0.30

In-Place Containment/Cover	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required:	7,500	279	321
Total Common Backfill Required:	5,000	186	214
Total Topsoil Required:	2,500	93	107

Excavated Area/Full Site	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Excavated Soil:	10,000	372	428
Total Common Backfill Required:	5,000	186	214
Total Topsoil Required:	5,000	186	214

Mine Disposal	
Assumed Density for Soil (TN/LCY)	1.375
Total Volume of Soil (LCY)	428
Total Weight of Soil Excavated (TN)	**589**

Engineered Controls	Area (SF)
Length of Chainlink Fence Required (LF)	3,330
Number of Warning Sings Required (EA)	11

Cover System	Feet
Thickness of Subsoil	1.0
Thickness of Topsoil	0.5

Excavation and Backfill Depths	Feet	Subsoil (FT)	Topsoil (FT)
Excavation Depth	1.0		
Backfill Depth		0.5	0.5

Description	Ratio/Factors
Expansion Factor	1.15
Fence - LF/Day	200
Cover/Excavation - CY/Day	100

Estimated Duration of the Project		
Number of Years to Complete:	0.09	years
Number of Months (April 1 to Nov 30):	0.66	months
4 Days off per month in 30 days months:	26	per month
Number of working days (200 lf/day)	17	days
Total number of working days:	17	days

Notes:
Based on the above mentioned assumptions; duration for cover construction, excavation and backfill would require 8 days and construction of engineered controls would require 17 days. Thus the overall project duration is based on the duration for engineered control construction.

Number Borrow Area Samples (1/10,000 CY)
1

Notes:
Input fields are denoted by a dashed line. Do not overwrite information not contained within the dashed lines.

Appendix C

Screening of Alternatives

The evaluations of each alternative using the three screening criteria are presented in the following Appendix C. The common justifications have been indicated using gray text to allow the reader to focus on the differences between alternatives.

Alternative 1
No Action

Exhibit C-1. Effectiveness Screening - Alternative 1

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated surface and subsurface soil on the site was largely addressed during previous interim remedial actions through removal and offsite disposal and/or in-place containment with covers. Remaining contaminated surface soil present in the west embankments of Highway 37 and area surrounding sample location 1-03000 within the Flyway Subarea is left unaddressed. If existing covers are disturbed by human trespassers or ecological receptors, contaminated soil exposed under covers could allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water). ■ If disturbed, contaminated soil could liberate asbestos fibers to air and potentially represent an inhalation exposure risk to human receptors. ■ Soil within seasonally flooded areas of the Flyway Subarea has not been investigated or characterized. Since these areas are left unaddressed, they could potentially pose an exposure risk to human or ecological receptors if contaminated. ■ The Kootenai River is adjacent to the Screening Plant and Flyway Subareas. If flooding is significant, erosion of covers adjacent to the riverbank could potentially cause migration of contaminated soil to surface water. Contaminated soil transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future.
Compliance with ARARs	■ No further action is taken to address contaminated soil; presence of unaddressed contaminated soil may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air. Thus this criterion is not met.
Short-term effectiveness (during the remedial construction and implementation period)	■ No further remedial action would be undertaken to address contaminated soil; thus, none of these criteria are met.
Long-term effectiveness and permanence (following remedial construction)	
Reduction of toxicity, mobility, or volume through treatment	
Overall Rating	⓿

Table C-2. Implementability Screening - Alternative 1

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ No further remedial action would be undertaken to address site; thus, ability to meet these criteria is high.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	
Ability to obtain approvals from other agencies	■ No further remedial action would be taken to address the remaining contaminated soil; thus, there is no need to obtain approvals from other regulatory agencies.
Availability and capacity of treatment, storage, and disposal services	■ No further remedial action would be taken to address the remaining contaminated soil; thus, this criterion is not applicable.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ Technical specialists and equipment are available for monitoring during 5-year site reviews.
Overall Rating	❺

Table C-3. Cost Screening – Alternative 1

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Present Value Dollars)
Present Value Cost	$	$110,000

Alternative 2

Institutional and Engineered Controls with Monitoring

Table C-4. Effectiveness Screening - Alternative 2

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated surface and subsurface soil on the site was largely addressed during previous interim remedial actions through removal and offsite disposal and/or in-place containment with covers. ■ Institutional controls and engineered controls would be implemented to exclude access and unacceptable uses of the site by human receptors, including contaminated soil previously covered under interim remedial actions and soil within seasonally flooded areas of the Flyway Subarea that has not been investigated or characterized. ■ Contaminated surface soil present in the west embankments of Highway 37 would be addressed primarily by institutional controls. ■ Contaminated soil surrounding sample location 1-03000 within the Flyway Subarea would be addressed by institutional and engineered controls. ■ If existing covers are disturbed by human trespassers or ecological receptors, contaminated soil exposed under covers could allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water). ■ If disturbed, contaminated soil could liberate asbestos fibers to air and potentially represent an inhalation exposure risk to human receptors. The Kootenai River is adjacent to the Screening Plant and Flyway Subareas. If flooding is significant, erosion of covers adjacent to the riverbank could potentially cause migration of contaminated soil to surface water. Contaminated soil transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ■ Monitoring would be required for effectiveness of the remedy.
Compliance with ARARs	■ Institutional/engineered controls do not physically address migration of site contamination; presence of unaddressed contaminated soil may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and implementation period)	■ Surface disturbance of contaminated soil could pose short-term risks to workers during installation of engineered controls. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Short-term risks posed to the community during implementation of the alternative relate to exposure to trespassers within the fenced areas of the site.
Long-term effectiveness and permanence (following remedial construction)	■ Contaminated surface soil present in the west embankments of Highway 37 and the area surrounding sample location 1-03000 within the Flyway Subarea is left physically unaddressed. ■ Long-term effectiveness and permanence is not entirely ensured since contaminated subsurface soil potentially posing a risk is left on site beneath the covers placed during the interim remedial action. ■ The Kootenai River may erode the riverbank, especially during large flows, which could potentially cause migration of contaminated soil to surface water over time if O&M of existing covers is not performed. ■ Long-term effectiveness and permanence of the engineered controls is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the institutional controls is dependent on administrative and legal enforcement of the controls. ■ Monitoring of ambient air is necessary for ensuring protection of human health outside the fencing around the site.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative does not treat contaminated soil; thus this criterion is not met.
Overall Rating	❸

Table C-5. Implementability Screening - Alternative 2

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Construction and maintenance of engineered controls within the flooded areas could be challenging during high water periods. ■ Implementation of monitoring is relatively straightforward and reliably operated. ■ Institutional controls could be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of engineered controls and implementation of monitoring are easily implemented. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.
Ability to obtain approvals from other agencies	■ Regulatory approvals for monitoring and engineered controls should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
Availability and capacity of treatment, storage, and disposal services	■ This alternative does not call for any treatment, storage and disposal services; thus, this criterion is not applicable.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained. ■ Materials, equipment, and labor resources used for institutional/engineered controls and monitoring are easily obtainable. ■ Technical specialists and equipment are available for implementation the remedy.
Overall Rating	❸

Table C-6. Cost Screening – Alternative 2

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Present Value Dollars)
Present Value Cost	$$$	$640,000

Alternative 3a

In-Place Containment of Contaminated Soil within Flyway Subarea, Institutional and Engineered Controls with Monitoring

Table C-7. Effectiveness Screening - Alternative 3a

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated surface and subsurface soil on the site was largely addressed during previous interim remedial actions through removal and offsite disposal and/or in-place containment with covers. ■ Institutional controls and engineered controls would be implemented to exclude access and unacceptable uses of the site by human receptors, including contaminated soil previously covered under interim remedial actions and soil within seasonally flooded areas of the Flyway Subarea that has not been investigated or characterized. ■ Contaminated surface soil present in the west embankments of Highway 37 within the Flyway Subarea is addressed through in-place containment (covers) as well as institutional controls. ■ Contaminated surface soil in the area surrounding sample location 1-03000 within the Flyway Subarea is addressed through in-place containment (covers) as well as institutional and engineered controls. ■ If existing and newly-constructed covers are disturbed by human trespassers or ecological receptors, contaminated soil exposed under covers could allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water). ■ If disturbed, contaminated soil could liberate asbestos fibers to air and potentially represent an inhalation exposure risk to human receptors. ■ The Kootenai River is adjacent to the Screening Plant and Flyway Subareas. If flooding is significant, erosion of covers adjacent to the riverbank could potentially cause migration of contaminated soil to surface water. Contaminated soil transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ■ Monitoring would be required for effectiveness of the remedy.
Compliance with ARARs	■ Contaminated surface soil contained in-place with covers would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air. ■ Institutional/engineered controls do not physically address migration of site contamination; presence of unaddressed contaminated soil may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and implementation period)	■ Surface disturbance of contaminated soil could pose short-term risks to workers during installation of covers and engineered controls. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Short-term risks to the community may be posed by construction of covers within the Highway 37 right-of-way. Measures such as temporary lane closures may be required over the period of cover construction. ■ Short-term risks posed to the community during implementation of the alternative also relate to exposure to trespassers within the exclusion zones of the site during construction.

Table C-7. Effectiveness Screening - Alternative 3a (continued)

Effectiveness Criteria	Evaluation Summary
Long-term effectiveness and permanence (following remedial construction) - continued	■ Long-term effectiveness and permanence is not entirely ensured since contaminated soil potentially posing a risk is left on site beneath the covers (including covers placed during the interim remedial action). ■ The Kootenai River may erode the riverbank, especially during large flows, which could potentially cause migration of contaminated soil to surface water over time if O&M of existing covers is not performed. ■ Long-term effectiveness and permanence of the engineered controls is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the covers is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the institutional controls is dependent on administrative and legal enforcement of the controls. ■ Monitoring of ambient air is necessary for ensuring protection of human health outside the fencing around the site.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative does not treat contaminated soil; thus this criterion is not met.
Overall Rating	❸

Table C-8. Implementability Screening - Alternative 3a

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Construction of covers is relatively straightforward and can be reliably operated. ■ Construction and maintenance of engineered controls within the flooded areas could be challenging during high water periods. ■ Implementation of monitoring is relatively straightforward and reliably operated. ■ Institutional controls could be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of covers and engineered controls are relatively easy to implement. ■ Monitoring can be easily implemented. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.
Ability to obtain approvals from other agencies	■ Regulatory approval for in-place containment of contaminated soil using covers and engineered controls should be obtainable. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
Availability and capacity of treatment, storage, and disposal services	■ This alternative does not call for any treatment, storage and disposal services; thus, this criterion is not applicable.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained. ■ Labor, equipment, and materials for cover construction controls are available. ■ Suitable cover construction materials would be required from offsite sources outside of the Libby valley. ■ Materials, equipment, and labor resources used for institutional/engineered controls and monitoring are easily obtainable. ■ Technical specialists and equipment are available for implementation the remedy.
Overall Rating	❸

Table C-9. Cost Screening - Alternative 3a

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Present Value Dollars)
Present Value Cost	$$$	$700,000

Alternative 3b

In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Table C-10. Effectiveness Screening - Alternative 3b

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated surface and subsurface soil on the site was largely addressed during previous interim remedial actions through removal and offsite disposal and/or in-place containment with covers. ■ Institutional controls and engineered controls would be implemented to exclude access and unacceptable uses of the site by human receptors, including contaminated soil previously covered under interim remedial actions and soil within seasonally flooded areas of the Flyway Subarea that has not been investigated or characterized. ■ Contaminated surface soil present in the west embankments of Highway 37 within the Flyway Subarea is addressed through in-place containment (covers) as well as institutional controls ■ Contaminated surface soil in the area surrounding sample location 1-03000 within the Flyway Subarea is addressed through removal (excavation) and offsite disposal at the Former Libby Vermiculite Mine as well as institutional and engineered controls. Excavations would be backfilled with clean soil from outside the Libby valley. ■ If existing and newly-constructed covers or backfilled areas are disturbed by human trespassers or ecological receptors, contaminated soil would allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water). ■ If disturbed, contaminated soil could liberate asbestos fibers to air and potentially represent an inhalation exposure risk to human receptors. ■ The Kootenai River is adjacent to the Screening Plant and Flyway Subareas. If flooding is significant, erosion of covers adjacent to the riverbank could potentially cause migration of contaminated soil to surface water. Contaminated soil transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ■ Monitoring would be required for effectiveness of the remedy.
Compliance with ARARs	■ Contaminated surface soil contained in-place with covers along with removal of contaminated soil and offsite disposal would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air. ■ Institutional/engineered controls do not physically address migration of site contamination; presence of unaddressed contaminated soil may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and implementation period)	■ Surface disturbance of contaminated soil could pose short-term risks to workers during installation of covers, removal and offsite disposal of contaminated soil, and engineered controls. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Short-term risks to the community may be posed by construction of covers within the Highway 37 right-of-way and transport of contaminated soil to the former Libby Vermiculite Mine for disposal. Measures such as temporary lane closures may be required over the period of cover construction and contaminated soil hauling. ■ Short-term risks posed to the community during implementation of the alternative also relate to exposure to trespassers within the exclusion zones of the site during construction.

Table C-10. Effectiveness Screening - Alternative 3b (continued)

Effectiveness Criteria	Evaluation Summary
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence is not entirely ensured since contaminated soil potentially posing a risk is left on site beneath the covers (including covers placed during the interim remedial action) and backfilled areas. ■ The Kootenai River may erode the riverbank, especially during large flows, which could potentially cause migration of contaminated soil to surface water over time if O&M of existing covers is not performed. ■ Long-term effectiveness and permanence of the engineered controls is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the covers and backfilled areas is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the institutional controls is dependent on administrative and legal enforcement of the controls. ■ Monitoring of ambient air is necessary for ensuring protection of human health outside the fencing around the site.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative does not treat contaminated soil; thus this criterion is not met.
Overall Rating	❸

Table C-11. Implementability Screening - Alternative 3b

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Construction of covers and removal of contaminated soil is relatively straightforward and can be reliably operated. ■ Removed contaminated soil would require transportation for offsite disposal in enclosed trucks. ■ Construction and maintenance of engineered controls within the flooded areas could be challenging during high water periods. ■ Implementation of monitoring is relatively straightforward and reliably operated. ■ Institutional controls could be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of covers, backfilled areas, and engineered controls are relatively easy to implement. ■ Monitoring can be easily implemented. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.
Ability to obtain approvals from other agencies	■ Regulatory approval for in-place containment of contaminated surface soil using covers, removal (excavation) and offsite disposal of contaminated soil and engineered controls should be obtainable. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
Availability and capacity of treatment, storage, and disposal services	■ The former Libby Vermiculite Mine is available for disposal and has the capacity to accept the total volume of excavated contaminated soil.

Table C-11. Implementability Screening - Alternative 3b (continued)

Implementability Criteria	Evaluation Summary
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained. ■ Labor, equipment, and materials for cover construction, contaminated soil removal, and clean soil backfilling, are available. ■ Suitable cover construction and backfill materials would be required from offsite sources outside of the Libby valley. ■ Materials, equipment, and labor resources used for institutional/engineered controls and monitoring are easily obtainable. ■ Technical specialists and equipment are available for implementation the remedy.
Overall Rating	❸

Table C-12. Cost Screening - Alternative 3b

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Present Value Dollars)
Present Value Cost	$$$	$720,000

Alternative 4

Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Table C-13. Effectiveness Screening - Alternative 4

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated surface and subsurface soil on the site was largely addressed during previous interim remedial actions through removal and offsite disposal and/or in-place containment with covers. ■ Institutional controls and engineered controls would be implemented to exclude access and unacceptable uses of the site by human receptors, including contaminated soil previously covered under interim remedial actions and soil within seasonally flooded areas of the Flyway Subarea that has not been investigated or characterized. ■ Contaminated surface soil present in the west embankments of Highway 37 and the area surrounding sample location 1-03000 within the Flyway Subarea is addressed through removal and offsite disposal at the Former Libby Vermiculite Mine. Excavations would be backfilled with clean soil from outside the Libby valley. ■ If existing and newly-constructed covers or backfilled areas are disturbed by human trespassers or ecological receptors, contaminated soil would allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water). ■ If disturbed, contaminated soil could liberate asbestos fibers to air and potentially represent an inhalation exposure risk to human receptors. ■ The Kootenai River is adjacent to the Screening Plant and Flyway Subareas. If flooding is significant, erosion of covers adjacent to the riverbank could potentially cause migration of contaminated soil to surface water. Contaminated soil transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ■ Monitoring would be required for effectiveness of the remedy.
Compliance with ARARs	■ Removal of contaminated surface soil and offsite disposal coupled with backfilled excavations would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air. ■ Institutional/engineered controls do not physically address migration of site contamination; presence of unaddressed contaminated soil may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and imple-mentation period)	■ Surface disturbance of contaminated soil could pose short-term risks to workers during removal and offsite disposal of contaminated soil, and engineered controls. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Short-term risks to the community may be posed by excavation within the Highway 37 right-of-way and transport of contaminated soil to the former Libby Vermiculite Mine for disposal. Measures such as temporary lane closures may be required over the period of excavation and contaminated soil hauling. ■ Short-term risks posed to the community during implementation of the alternative also relate to exposure to trespassers within the exclusion zones of the site during construction.
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence is not entirely ensured since contaminated soil potentially posing a risk is left on site beneath the covers and backfilled areas. ■ The Kootenai River may erode the riverbank, especially during large flows, which could potentially cause migration of contaminated soil to surface water over time if O&M of existing covers is not performed. ■ Long-term effectiveness and permanence of the engineered controls is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the covers and backfilled areas is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the institutional controls is dependent on administrative and legal enforcement of the controls.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative does not treat contaminated soil; thus this criterion is not met.
Overall Rating	❸

Table C-14. Implementability Screening - Alternative 4

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Removal of contaminated soil within the west embankments of Highway 37 is not feasible due to concerns regarding integrity of highway pavement, without significant disruption of the highway. Removal could lead to embankment instability and shutdown of the highway for rebuilding the pavement and the embankment. ■ Removed contaminated soil would require transportation for offsite disposal in enclosed trucks. ■ Construction and maintenance of engineered controls within the flooded areas could be challenging during high water periods. ■ Implementation of monitoring is relatively straightforward and reliably operated. ■ Institutional controls would be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of covers, backfilled areas, and engineered controls are relatively easy to implement. ■ Monitoring can be easily implemented. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.
Ability to obtain approvals from other agencies	■ Regulatory approval needed to remove contaminated soil within the west embankments of Highway 37 could be problematic. Highway 37 is a major traffic route to Lake Koocanusa and Canada from the Libby Area, which makes approval for extended shutdowns unlikely. ■ Regulatory approval needed to remove contaminated soil within the area surrounding sample location 1-03000 should be obtainable. ■ Regulatory approval for engineered controls should be obtainable. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
Availability and capacity of treatment, storage, and disposal services	■ The former Libby Vermiculite Mine is available for disposal and has the capacity to accept the total volume of excavated contaminated soil.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained. ■ Labor, equipment, and materials for contaminated soil removal and clean soil backfilling are available. ■ Suitable backfill materials would be required from offsite sources outside of the Libby valley. ■ Materials, equipment, and labor resources used for institutional/engineered controls and monitoring are easily obtainable. ■ Technical specialists and equipment are available for implementation the remedy.
Overall Rating	❷

Table C-15. Cost Screening - Alternative 4

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Present Value Dollars)
Present Value Cost	$$$	$710,000

Alternative 5

Removal of Contaminated Soil within the Flyway Subarea, Offsite Thermo-Chemical Treatment and Reuse of Treated Material, Institutional and Engineered Controls with Monitoring

Table C-16. Effectiveness Screening - Alternative 5

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated surface and subsurface soil on the site was largely addressed during previous interim remedial actions through removal and offsite disposal and/or in-place containment with covers. ■ Institutional controls and engineered controls would be implemented to exclude access and unacceptable uses of the site by human receptors, including contaminated soil previously covered under interim remedial actions and soil within seasonally flooded areas of the Flyway Subarea that has not been investigated or characterized. ■ Contaminated surface soil present in the west embankments of Highway 37 and the area surrounding sample location 1-03000 within the Flyway Subarea is addressed through removal and offsite treatment at a permitted thermo-chemical treatment facility. ■ ACM is converted to an inert form that does not pose human health risks. Excavations would be backfilled with a combination of treated inert material supplemented with clean soil from outside the Libby valley. ■ If existing and newly-constructed covers or backfilled areas are disturbed by human trespassers or ecological receptors, contaminated soil would allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water). ■ If disturbed, contaminated soil could liberate asbestos fibers to air and potentially represent an inhalation exposure risk to human receptors. ■ The Kootenai River is adjacent to the Screening Plant and Flyway Subareas. If flooding is significant, erosion of covers adjacent to the riverbank could potentially cause migration of contaminated soil to surface water. Contaminated soil transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ■ Monitoring would be required for effectiveness of the remedy.
Compliance with ARARs	■ Removal of contaminated soil and offsite treatment coupled with backfilled excavations would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air. ■ Institutional/engineered controls do not physically address migration of site contamination; presence of unaddressed contaminated soil may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and implementation period)	■ Surface disturbance of contaminated soil could pose short-term risks to workers during removal and offsite disposal of contaminated soil, and engineered controls. ■ Offsite treatment of contaminated soil could pose short-term risks to workers at the treatment facility. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Short-term risks to the community may be posed by excavation within the Highway 37 right-of-way and transport of contaminated soil to the offsite treatment facility. Measures such as temporary lane closures may be required over the period of excavation and contaminated soil hauling. ■ Short-term risks posed to the community during implementation of the alternative also relate to exposure to trespassers within the exclusion zones of the site during construction.

Table C-16. Effectiveness Screening - Alternative 5 (continued)

Effectiveness Criteria	Evaluation Summary
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence is not entirely ensured since contaminated soil potentially posing a risk is left on site beneath the backfilled areas. ■ The Kootenai River may erode the riverbank, especially during large flows, which could potentially cause migration of contaminated soil to surface water over time if O&M of existing covers is not performed. ■ While studies provided by ARI indicate that the treatment process completely converts ACM to an inert form, the treatment process is relatively new and there is not extensive data indicating whether the treatment process has long-term effectiveness and permanence. ■ Long-term effectiveness and permanence of the engineered controls is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the covers and backfilled areas is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the institutional controls is dependent on administrative and legal enforcement of the controls.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative involves treatment, which transforms asbestos to an amorphous inert form; thus, toxicity and mobility of asbestos fibers is eliminated. ■ A very small volume of contaminated soil would be treated as compared to volume of contaminated soil present onsite. ■ Volume reduction of contaminated soil is limited.
Overall Rating	❸

Table C-17. Implementability Screening - Alternative 5

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Removal of contaminated soil within the west embankments of Highway 37 is not feasible due to concerns regarding integrity of highway pavement, without significant disruption of the highway. Removal could lead to embankment instability and shutdown of the highway for rebuilding the pavement and the embankment. ■ Removed contaminated soil requires transportation to the offsite treatment facility in enclosed trucks. ■ The treatment process (TCCT) is a patented technology and is commercially available but not widespread. ■ The TCCT system is currently located in Washington State; thus the contaminated soil from the site would have to be shipped to Washington State for treatment. ■ The TCCT vendor has indicated that treatment goals for contaminated soil can be met; however no site-specific treatability testing has been performed. ■ Construction and maintenance of engineered controls within the flooded areas could be challenging during high water periods. ■ Implementation of monitoring is relatively straightforward and reliably operated. ■ Institutional controls would be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of covers, backfilled areas, and engineered controls are relatively easy to implement. ■ Monitoring can be easily implemented. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.

Table C-17. Implementability Screening - Alternative 5

Implementability Criteria	Evaluation Summary
Ability to obtain approvals from other agencies	■ The TCCT technology is permitted and regulated in Washington State; however it is unclear if regulatory approval would be obtainable in Montana. ■ Regulatory approval needed to remove contaminated soil within the west embankments of Highway 37 could be problematic. Highway 37 is a major traffic route to Lake Koocanusa and Canada from the Libby Area, which makes approval for extended shutdowns unlikely. ■ Regulatory approval needed to remove contaminated soil within the area surrounding sample location 1-03000 should be obtainable. ■ Regulatory approval for use of treated material as backfill material may be problematic, depending on DEQ classification of the treated material. ■ Regulatory approval for engineered controls should be obtainable. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
Availability and capacity of treatment, storage, and disposal services	■ The treatment process (TCCT) is a patented technology and is commercially available but not widespread. ■ The treatment capacity depends upon the size of the offsite treatment facility; in general the capacity for treatment should be acceptable relative to the volume of contaminated soil generated from the site, based on discussions with ARI.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained. ■ Labor, equipment, and materials for contaminated soil removal and clean soil backfilling are available. ■ Suitable backfill materials would be required from offsite sources outside of the Libby valley. ■ Materials, equipment, and labor resources used for institutional/engineered controls and monitoring are easily obtainable. ■ Technical specialists and equipment for implementation of thermo-chemical treatment are fairly limited in the United States. ■ Technical specialists and equipment are available for implementation of institutional controls and monitoring.
Overall Rating	❶

Table C-18. Cost Screening - Alternative 5

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Present Value Dollars)
Present Value Cost	$$$$	$1,310,000

Appendix D

Alternative Screening Cost Information

Present Value Analyses

TABLE SPV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 o "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE SPV-1

PRESENT VALUE ANALYSIS

Alternative 1
No Action

Site:	**OU2 - Former Screening Plant**
Location:	**Libby, Montana**
Phase:	**Final Feasibility Study**
Base Year:	**2009**

Year[1]	Capital Costs[2]	Annual O&M Costs	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	1.0000	$0
1	$0	$0	$0	$0	0.9346	$0
2	$0	$0	$0	$0	0.8734	$0
3	$0	$0	$0	$0	0.8163	$0
4	$0	$0	$0	$0	0.7629	$0
5	$0	$0	$53,000	$53,000	0.7130	$37,789
6	$0	$0	$0	$0	0.6663	$0
7	$0	$0	$0	$0	0.6227	$0
8	$0	$0	$0	$0	0.5820	$0
9	$0	$0	$0	$0	0.5439	$0
10	$0	$0	$53,000	$53,000	0.5083	$26,940
11	$0	$0	$0	$0	0.4751	$0
12	$0	$0	$0	$0	0.4440	$0
13	$0	$0	$0	$0	0.4150	$0
14	$0	$0	$0	$0	0.3878	$0
15	$0	$0	$53,000	$53,000	0.3624	$19,207
16	$0	$0	$0	$0	0.3387	$0
17	$0	$0	$0	$0	0.3166	$0
18	$0	$0	$0	$0	0.2959	$0
19	$0	$0	$0	$0	0.2765	$0
20	$0	$0	$53,000	$53,000	0.2584	$13,695
21	$0	$0	$0	$0	0.2415	$0
22	$0	$0	$0	$0	0.2257	$0
23	$0	$0	$0	$0	0.2109	$0
24	$0	$0	$0	$0	0.1971	$0
25	$0	$0	$53,000	$53,000	0.1842	$9,763
26	$0	$0	$0	$0	0.1722	$0
27	$0	$0	$0	$0	0.1609	$0
28	$0	$0	$0	$0	0.1504	$0
29	$0	$0	$0	$0	0.1406	$0
30	$0	$0	$53,000	$53,000	0.1314	$6,964
TOTALS:	$0	$0	$318,000	$318,000		$114,358
TOTAL PRESENT VALUE OF ALTERNATIVE 1[5]						**$110,000**

Notes:

[1] Duration is assumed to be 30 years for present value analysis.

[2] Costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-1.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.

[5] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.

They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE SPV-2

PRESENT VALUE ANALYSIS

Alternative 2
Institutional and Engineered Controls with Monitorin

Site:	**OU2 - Former Screening Plant**
Location:	**Libby, Montana**
Phase:	**Final Feasibility Study**
Base Year:	**2009**

Year[1]	Capital Costs (Institutional and Engineered Controls)[2]	Annual O&M Costs (Site Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	1.0000	$0
1	$240,000	$0	$0	$240,000	0.9346	$224,304
2	$0	$26,000	$0	$26,000	0.8734	$22,708
3	$0	$26,000	$0	$26,000	0.8163	$21,224
4	$0	$26,000	$0	$26,000	0.7629	$19,835
5	$0	$26,000	$53,000	$79,000	0.7130	$56,327
6	$0	$26,000	$0	$26,000	0.6663	$17,324
7	$0	$26,000	$0	$26,000	0.6227	$16,190
8	$0	$26,000	$0	$26,000	0.5820	$15,132
9	$0	$26,000	$0	$26,000	0.5439	$14,141
10	$0	$26,000	$53,000	$79,000	0.5083	$40,156
11	$0	$26,000	$0	$26,000	0.4751	$12,353
12	$0	$26,000	$0	$26,000	0.4440	$11,544
13	$0	$26,000	$0	$26,000	0.4150	$10,790
14	$0	$26,000	$0	$26,000	0.3878	$10,083
15	$0	$26,000	$53,000	$79,000	0.3624	$28,630
16	$0	$26,000	$0	$26,000	0.3387	$8,806
17	$0	$26,000	$0	$26,000	0.3166	$8,232
18	$0	$26,000	$0	$26,000	0.2959	$7,693
19	$0	$26,000	$0	$26,000	0.2765	$7,189
20	$0	$26,000	$53,000	$79,000	0.2584	$20,414
21	$0	$26,000	$0	$26,000	0.2415	$6,279
22	$0	$26,000	$0	$26,000	0.2257	$5,868
23	$0	$26,000	$0	$26,000	0.2109	$5,483
24	$0	$26,000	$0	$26,000	0.1971	$5,125
25	$0	$26,000	$53,000	$79,000	0.1842	$14,552
26	$0	$26,000	$0	$26,000	0.1722	$4,477
27	$0	$26,000	$0	$26,000	0.1609	$4,183
28	$0	$26,000	$0	$26,000	0.1504	$3,910
29	$0	$26,000	$0	$26,000	0.1406	$3,656
30	$0	$26,000	$53,000	$79,000	0.1314	$10,381
TOTALS:	$240,000	$754,000	$318,000	$1,312,000		$636,989
TOTAL PRESENT VALUE OF ALTERNATIVE 2[5]						**$640,000**

Notes:
1 Duration is assumed to be 30 years for present value analysis.
2 Costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-2.
3 Total annual expenditure is the total cost per year with no discounting.
4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.
5 Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.

They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE SPV-3a

PRESENT VALUE ANALYSIS

Alternative 3a

In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Year[1]	Capital Costs (Institutional and Engineered Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Site Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$240,000	$72,000	$0	$0	$312,000	0.9346	$291,595
2	$0	$0	$26,000	$0	$26,000	0.8734	$22,708
3	$0	$0	$26,000	$0	$26,000	0.8163	$21,224
4	$0	$0	$26,000	$0	$26,000	0.7629	$19,835
5	$0	$0	$26,000	$53,000	$79,000	0.7130	$56,327
6	$0	$0	$26,000	$0	$26,000	0.6663	$17,324
7	$0	$0	$26,000	$0	$26,000	0.6227	$16,190
8	$0	$0	$26,000	$0	$26,000	0.5820	$15,132
9	$0	$0	$26,000	$0	$26,000	0.5439	$14,141
10	$0	$0	$26,000	$53,000	$79,000	0.5083	$40,156
11	$0	$0	$26,000	$0	$26,000	0.4751	$12,353
12	$0	$0	$26,000	$0	$26,000	0.4440	$11,544
13	$0	$0	$26,000	$0	$26,000	0.4150	$10,790
14	$0	$0	$26,000	$0	$26,000	0.3878	$10,083
15	$0	$0	$26,000	$53,000	$79,000	0.3624	$28,630
16	$0	$0	$26,000	$0	$26,000	0.3387	$8,806
17	$0	$0	$26,000	$0	$26,000	0.3166	$8,232
18	$0	$0	$26,000	$0	$26,000	0.2959	$7,693
19	$0	$0	$26,000	$0	$26,000	0.2765	$7,189
20	$0	$0	$26,000	$53,000	$79,000	0.2584	$20,414
21	$0	$0	$26,000	$0	$26,000	0.2415	$6,279
22	$0	$0	$26,000	$0	$26,000	0.2257	$5,868
23	$0	$0	$26,000	$0	$26,000	0.2109	$5,483
24	$0	$0	$26,000	$0	$26,000	0.1971	$5,125
25	$0	$0	$26,000	$53,000	$79,000	0.1842	$14,552
26	$0	$0	$26,000	$0	$26,000	0.1722	$4,477
27	$0	$0	$26,000	$0	$26,000	0.1609	$4,183
28	$0	$0	$26,000	$0	$26,000	0.1504	$3,910
29	$0	$0	$26,000	$0	$26,000	0.1406	$3,656
30	$0	$0	$26,000	$53,000	$79,000	0.1314	$10,381
TOTALS:	$240,000	$72,000	$754,000	$318,000	$1,384,000		$704,280
TOTAL PRESENT VALUE OF ALTERNATIVE 3a[5]							**$700,000**

Notes:

1 Duration is assumed to be 30 years for present value analysis.
2 Costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-3a.
3 Total annual expenditure is the total cost per year with no discounting.
4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.
5 Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.
They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE SPV-3b

PRESENT VALUE ANALYSIS

Alternative 3b

In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Year[1]	Capital Costs (Institutional and Engineered Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Site Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$240,000	$84,000	$0	$0	$324,000	0.9346	$302,810
2	$0	$0	$26,000	$0	$26,000	0.8734	$22,708
3	$0	$0	$26,000	$0	$26,000	0.8163	$21,224
4	$0	$0	$26,000	$0	$26,000	0.7629	$19,835
5	$0	$0	$26,000	$53,000	$79,000	0.7130	$56,327
6	$0	$0	$26,000	$0	$26,000	0.6663	$17,324
7	$0	$0	$26,000	$0	$26,000	0.6227	$16,190
8	$0	$0	$26,000	$0	$26,000	0.5820	$15,132
9	$0	$0	$26,000	$0	$26,000	0.5439	$14,141
10	$0	$0	$26,000	$53,000	$79,000	0.5083	$40,156
11	$0	$0	$26,000	$0	$26,000	0.4751	$12,353
12	$0	$0	$26,000	$0	$26,000	0.4440	$11,544
13	$0	$0	$26,000	$0	$26,000	0.4150	$10,790
14	$0	$0	$26,000	$0	$26,000	0.3878	$10,083
15	$0	$0	$26,000	$53,000	$79,000	0.3624	$28,630
16	$0	$0	$26,000	$0	$26,000	0.3387	$8,806
17	$0	$0	$26,000	$0	$26,000	0.3166	$8,232
18	$0	$0	$26,000	$0	$26,000	0.2959	$7,693
19	$0	$0	$26,000	$0	$26,000	0.2765	$7,189
20	$0	$0	$26,000	$53,000	$79,000	0.2584	$20,414
21	$0	$0	$26,000	$0	$26,000	0.2415	$6,279
22	$0	$0	$26,000	$0	$26,000	0.2257	$5,868
23	$0	$0	$26,000	$0	$26,000	0.2109	$5,483
24	$0	$0	$26,000	$0	$26,000	0.1971	$5,125
25	$0	$0	$26,000	$53,000	$79,000	0.1842	$14,552
26	$0	$0	$26,000	$0	$26,000	0.1722	$4,477
27	$0	$0	$26,000	$0	$26,000	0.1609	$4,183
28	$0	$0	$26,000	$0	$26,000	0.1504	$3,910
29	$0	$0	$26,000	$0	$26,000	0.1406	$3,656
30	$0	$0	$26,000	$53,000	$79,000	0.1314	$10,381
TOTALS:	$240,000	$84,000	$754,000	$318,000	$1,396,000		$715,495
TOTAL PRESENT VALUE OF ALTERNATIVE 3b[5]							**$720,000**

Notes:
1 Duration is assumed to be 30 years for present value analysis.
2 Costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-3b.
3 Total annual expenditure is the total cost per year with no discounting.
4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.
5 Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE SPV-4

PRESENT VALUE ANALYSIS

Alternative 4

Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Year[1]	Capital Costs (Institutional and Engineered Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Site Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$240,000	$82,000	$0	$0	$322,000	0.9346	$300,941
2	$0	$0	$26,000	$0	$26,000	0.8734	$22,708
3	$0	$0	$26,000	$0	$26,000	0.8163	$21,224
4	$0	$0	$26,000	$0	$26,000	0.7629	$19,835
5	$0	$0	$26,000	$53,000	$79,000	0.7130	$56,327
6	$0	$0	$26,000	$0	$26,000	0.6663	$17,324
7	$0	$0	$26,000	$0	$26,000	0.6227	$16,190
8	$0	$0	$26,000	$0	$26,000	0.5820	$15,132
9	$0	$0	$26,000	$0	$26,000	0.5439	$14,141
10	$0	$0	$26,000	$53,000	$79,000	0.5083	$40,156
11	$0	$0	$26,000	$0	$26,000	0.4751	$12,353
12	$0	$0	$26,000	$0	$26,000	0.4440	$11,544
13	$0	$0	$26,000	$0	$26,000	0.4150	$10,790
14	$0	$0	$26,000	$0	$26,000	0.3878	$10,083
15	$0	$0	$26,000	$53,000	$79,000	0.3624	$28,630
16	$0	$0	$26,000	$0	$26,000	0.3387	$8,806
17	$0	$0	$26,000	$0	$26,000	0.3166	$8,232
18	$0	$0	$26,000	$0	$26,000	0.2959	$7,693
19	$0	$0	$26,000	$0	$26,000	0.2765	$7,189
20	$0	$0	$26,000	$53,000	$79,000	0.2584	$20,414
21	$0	$0	$26,000	$0	$26,000	0.2415	$6,279
22	$0	$0	$26,000	$0	$26,000	0.2257	$5,868
23	$0	$0	$26,000	$0	$26,000	0.2109	$5,483
24	$0	$0	$26,000	$0	$26,000	0.1971	$5,125
25	$0	$0	$26,000	$53,000	$79,000	0.1842	$14,552
26	$0	$0	$26,000	$0	$26,000	0.1722	$4,477
27	$0	$0	$26,000	$0	$26,000	0.1609	$4,183
28	$0	$0	$26,000	$0	$26,000	0.1504	$3,910
29	$0	$0	$26,000	$0	$26,000	0.1406	$3,656
30	$0	$0	$26,000	$53,000	$79,000	0.1314	$10,381
TOTALS:	$240,000	$82,000	$754,000	$318,000	$1,394,000		$713,626
TOTAL PRESENT VALUE OF ALTERNATIVE 4[5]							**$710,000**

Notes:

[1] Duration is assumed to be 30 years for present value analysis.

[2] Costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-4.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.

[5] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE SPV-5

PRESENT VALUE ANALYSIS

Alternative 5

Removal of Contaminated Soil within the Flyway Subarea, Offsite Thermo-Chemical Treatment and Reuse of Treated Material, Institutional and Engineered Controls with Monitoring

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Year[1]	Capital Costs (Institutional and Engineered Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Site Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$240,000	$725,000	$0	$0	$965,000	0.9346	$901,889
2	$0	$0	$26,000	$0	$26,000	0.8734	$22,708
3	$0	$0	$26,000	$0	$26,000	0.8163	$21,224
4	$0	$0	$26,000	$0	$26,000	0.7629	$19,835
5	$0	$0	$26,000	$53,000	$79,000	0.7130	$56,327
6	$0	$0	$26,000	$0	$26,000	0.6663	$17,324
7	$0	$0	$26,000	$0	$26,000	0.6227	$16,190
8	$0	$0	$26,000	$0	$26,000	0.5820	$15,132
9	$0	$0	$26,000	$0	$26,000	0.5439	$14,141
10	$0	$0	$26,000	$53,000	$79,000	0.5083	$40,156
11	$0	$0	$26,000	$0	$26,000	0.4751	$12,353
12	$0	$0	$26,000	$0	$26,000	0.4440	$11,544
13	$0	$0	$26,000	$0	$26,000	0.4150	$10,790
14	$0	$0	$26,000	$0	$26,000	0.3878	$10,083
15	$0	$0	$26,000	$53,000	$79,000	0.3624	$28,630
16	$0	$0	$26,000	$0	$26,000	0.3387	$8,806
17	$0	$0	$26,000	$0	$26,000	0.3166	$8,232
18	$0	$0	$26,000	$0	$26,000	0.2959	$7,693
19	$0	$0	$26,000	$0	$26,000	0.2765	$7,189
20	$0	$0	$26,000	$53,000	$79,000	0.2584	$20,414
21	$0	$0	$26,000	$0	$26,000	0.2415	$6,279
22	$0	$0	$26,000	$0	$26,000	0.2257	$5,868
23	$0	$0	$26,000	$0	$26,000	0.2109	$5,483
24	$0	$0	$26,000	$0	$26,000	0.1971	$5,125
25	$0	$0	$26,000	$53,000	$79,000	0.1842	$14,552
26	$0	$0	$26,000	$0	$26,000	0.1722	$4,477
27	$0	$0	$26,000	$0	$26,000	0.1609	$4,183
28	$0	$0	$26,000	$0	$26,000	0.1504	$3,910
29	$0	$0	$26,000	$0	$26,000	0.1406	$3,656
30	$0	$0	$26,000	$53,000	$79,000	0.1314	$10,381
TOTALS:	$240,000	$725,000	$754,000	$318,000	$2,037,000		$1,314,574
TOTAL PRESENT VALUE OF ALTERNATIVE 5[5]							**$1,310,000**

Notes:

1 Duration is assumed to be 30 years for present value analysis.

2 Costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-5.

3 Total annual expenditure is the total cost per year with no discounting.

4 Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.

5 Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Screening Cost Estimate Summaries

TABLE SCS-1

Alternative	**1**
No Action	

SCREENING COST ESTIMATE SUMMARY

Site:	OU2 - Former Screening Plant
Location:	Libby, Montana
Phase:	Final Feasibility Study
Base Year:	2009
Date:	August 31, 2009

Description: Alternative 1 (No Action) is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as a baseline for comparison against other remedial alternatives. This alternative would discontinue all current remedial activities and no further action would be initiated at the site to address the contaminated soil or otherwise mitigate the associated risks to human health or the environment. Five-year site reviews would be performed as required by the NCP to evaluate whether adequate protection of human health and the environment is provided. Site inspection would be performed as necessary to complete the 5-year site reviews. The No Action alternative provides an environmental baseline against which impacts of the various remedial alternatives can be compared.

5-YEAR SITE REVIEWS PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	**QTY**	**UNIT(S)**	**UNIT COST**	**TOTAL**	**NOTES**
5-Year Site Review	1	LS	$30,000	$30,000	Includes site inspection and 5-year review report
Community Awareness Activities	1	LS	$5,000	$5,000	Includes public notification and meetings associated with 5-year site review
SUBTOTAL				$35,000	
Contingency (Scope and Bid)	20%			$7,000	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$42,000	
Project Management	10%			$4,200	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$6,300	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$52,500	
TOTAL PERIODIC COST				**$53,000**	Total capital cost is rounded to the nearest $1,000.

Notes:

Refer to Table SCS-Notes for cost sources and explanation for various unit costs.

Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).

Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

LS	Lump Sum
QTY	Quantity

TABLE SCS-2

Alternative **2**
Institutional and Engineered Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 2 uses a remedial strategy that emphasizes engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the existing cover system (placed during the interim remedial actions) as well as existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	1	LS	$35,000	$35,000	Institutional controls for OU2 site
Engineered Controls	3,330	LF	$30	$99,900	Includes fencing and warning signage around the seasonally flooded areas
SUBTOTAL				$134,900	
Contingency (Scope and Bid)	20%			$26,980	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$161,880	
Project Management	8%			$12,950	Percentage from Exhibit 5-8 was used.
Remedial Design	15%			$24,282	Percentage from Exhibit 5-8 was used.
Construction Management	10%			$16,188	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$24,282	Middle value of the recommended range was used.
TOTAL				$239,582	
TOTAL CAPITAL COST				**$240,000**	Total capital cost is rounded to the nearest $1,000.

SITE MAINTENANCE AND INSPECTION ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 2 through 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Maintenance	1	LS	$15,000	$15,000	Includes maintenance of the remedy put in place
Annual Inspection	1	YR	$2,000	$2,000	Includes inspection of the remedy put in place
SUBTOTAL				$17,000	
Contingency (Scope and Bid)	20%			$3,400	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$20,400	
Project Management	10%			$2,040	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$3,060	Middle value of the recommended range was used.
TOTAL				$25,500	
TOTAL PERIODIC COST				**$26,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-2

Alternative **2**
Institutional and Engineered Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 2 uses a remedial strategy that emphasizes engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the existing cover system (placed during the interim remedial actions) as well as existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

5-YEAR SITE REVIEWS PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$30,000	$30,000	Includes site inspection and 5-year review report
Community Awareness Activities	1	LS	$5,000	$5,000	Includes public notification and meetings associated with 5-year site review
SUBTOTAL				$35,000	
Contingency (Scope and Bid)	20%			$7,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$42,000	
Project Management	10%			$4,200	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$6,300	Middle value of the recommended range was used.
TOTAL				$52,500	
TOTAL PERIODIC COST				**$53,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

LF	Linear Feet
LS	Lump Sum
QTY	Quantity
TN	Ton
YR	Year

TABLE SCS-3a

Alternative 3a
In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 3a uses a remedial strategy that emphasizes in-place containment (covers), institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Covers over contaminated soil would be constructed within the west embankments of Highway 37 and the area surrounding sample 1-03000 located inside the Flyway Subarea. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the newly-constructed and existing cover systems (placed during the interim remedial actions) as well as existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	1	LS	$35,000	$35,000	Institutional controls for OU2 site
Engineered Controls	3,330	LF	$30	$99,900	Includes fencing and warning signage around the seasonally flooded areas
SUBTOTAL				$134,900	
Contingency (Scope and Bid)	20%			$26,980	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$161,880	
Project Management	8%			$12,950	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	15%			$24,282	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	10%			$16,188	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$24,282	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$239,582	
TOTAL CAPITAL COST				**$240,000**	Total capital cost is rounded to the nearest $1,000.

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
In-Place Containment	0.5	ACR	$75,000	$37,500	Includes site clearing, mob/demob, in-place containment and revegetation
SUBTOTAL				$37,500	
Contingency (Scope and Bid)	20%			$7,500	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$45,000	
Project Management	10%			$4,500	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	20%			$9,000	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	15%			$6,750	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$6,750	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$72,000	
TOTAL CAPITAL COST				**$72,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-3a

Alternative 3a

In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 3a uses a remedial strategy that emphasizes in-place containment (covers), institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Covers over contaminated soil would be constructed within the west embankments of Highway 37 and the area surrounding sample 1-03000 located inside the Flyway Subarea. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the newly-constructed and existing cover systems (placed during the interim remedial actions) as well as existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

SITE MAINTENANCE AND INSPECTION ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 2 through 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Maintenance	1	LS	$15,000	$15,000	Includes maintenance of the remedy put in place
Annual Inspection	1	YR	$2,000	$2,000	Includes inspection of the remedy put in place
SUBTOTAL				$17,000	
Contingency (Scope and Bid)	20%			$3,400	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$20,400	
Project Management	10%			$2,040	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,060	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$25,500	
TOTAL PERIODIC COST				**$26,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEWS PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$30,000	$30,000	Includes site inspection and 5-year review report
Community Awareness Activities	1	LS	$5,000	$5,000	Includes public notification and meetings associated with 5-year site review
SUBTOTAL				$35,000	
Contingency (Scope and Bid)	20%			$7,000	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$42,000	
Project Management	10%			$4,200	The high end of the recommended range in EPA 540-R-00-002 was used.
Technical Support	15%			$6,300	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$52,500	
TOTAL PERIODIC COST				**$53,000**	Total capital cost is rounded to the nearest $1,000.

Notes:

Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

ACR	Acre
LF	Linear Feet
LS	Lump Sum
QTY	Quantity
YR	Year

TABLE SCS-3b

Alternative **3b**

In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 3b uses a remedial strategy that emphasizes in-place containment (covers), removal and offsite disposal of contaminated soil, institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Covers over contaminated soil would be constructed within the west embankments of Highway 37, and removal along with offsite disposal of contaminated soil would be conducted within area surrounding sample 1-03000. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the newly-constructed and existing cover systems (placed during the interim remedial actions) as well as newly-backfilled areas and existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	1	LS	$35,000	$35,000	Institutional controls for OU2 site
Engineered Controls	3,330	LF	$30	$99,900	Includes fencing and warning signage around the seasonally flooded areas
SUBTOTAL				$134,900	
Contingency (Scope and Bid)	20%			$26,980	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$161,880	
Project Management	8%			$12,950	Percentage from Exhibit 5-8 was used.
Remedial Design	15%			$24,282	Percentage from Exhibit 5-8 was used.
Construction Management	10%			$16,188	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$24,282	Middle value of the recommended range was used.
TOTAL				$239,582	
TOTAL CAPITAL COST				**$240,000**	Total capital cost is rounded to the nearest $1,000.

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
In-Place Containment	0.2	ACR	$75,000	$15,000	Includes site clearing, mob/demob, in-place containment and revegetation
Removal and Transport of Contaminated Soils	430	CY	$60	$25,800	Includes site clearing, mob/demob, removal and waste transportation to the mine
Handling and Disposal of Contaminated Soils	430	CY	$7	$3,010	Includes disposal of contaminated soils at the mine
SUBTOTAL				$43,810	
Contingency (Scope and Bid)	20%			$8,762	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$52,572	
Project Management	10%			$5,257	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	20%			$10,514	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	15%			$7,886	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$7,886	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$84,115	
TOTAL CAPITAL COST				**$84,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-3b

Alternative **3b**
In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 3b uses a remedial strategy that emphasizes in-place containment (covers), removal and offsite disposal of contaminated soil, institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Covers over contaminated soil would be constructed within the west embankments of Highway 37, and removal along with offsite disposal of contaminated soil would be conducted within area surrounding sample 1-03000. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the newly-constructed and existing cover systems (placed during the interim remedial actions) as well as newly-backfilled areas and existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

SITE MAINTENANCE AND INSPECTION ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 2 through 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Maintenance	1	LS	$15,000	$15,000	Includes maintenance of the remedy put in place
Annual Inspection	1	YR	$2,000	$2,000	Includes inspection of the remedy put in place
SUBTOTAL				$17,000	
Contingency (Scope and Bid)	20%			$3,400	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$20,400	
Project Management	10%			$2,040	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,060	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$25,500	
TOTAL PERIODIC COST				**$26,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEWS PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$30,000	$30,000	Includes site inspection and 5-year review report
Community Awareness Activities	1	LS	$5,000	$5,000	Includes public notification and meetings associated with 5-year site review
SUBTOTAL				$35,000	
Contingency (Scope and Bid)	20%			$7,000	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$42,000	
Project Management	10%			$4,200	The high end of the recommended range in EPA 540-R-00-002 was used.
Technical Support	15%			$6,300	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$52,500	
TOTAL PERIODIC COST				**$53,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:
ACR Acre
CY Cubic Yard
LF Linear Feet
LS Lump Sum
QTY Quantity
YR Year

TABLE SCS-4

Alternative 4

Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 4 uses a remedial strategy that emphasizes iremoval and offsite disposal of contaminated soil, institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Removal along with offsite disposal of contaminated soil would be conducted within the west embankments of Highway 37 and within area surrounding sample 1-03000. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the existing cover systems (placed during the interim remedial actions) as well as newly-backfilled areas and existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	1	LS	$35,000	$35,000	Institutional controls for OU2 site
Engineered Controls	3,330	LF	$30	$99,900	Includes fencing and warning signage around the seasonally flooded areas
SUBTOTAL				$134,900	
Contingency (Scope and Bid)	20%			$26,980	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$161,880	
Project Management	8%			$12,950	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	15%			$24,282	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	10%			$16,188	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$24,282	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$239,582	
TOTAL CAPITAL COST				**$240,000**	Total capital cost is rounded to the nearest $1,000.

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Removal and Transport of Contaminated Soils	640	CY	$60	$38,400	Includes site clearing, mob/demob, removal and waste transportation to the mine
Handling and Disposal of Contaminated Soils	640	CY	$7	$4,480	Includes disposal of contaminated soils at the mine
SUBTOTAL				$42,880	
Contingency (Scope and Bid)	20%			$8,576	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$51,456	
Project Management	10%			$5,146	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	20%			$10,291	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	15%			$7,718	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$7,718	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$82,329	
TOTAL CAPITAL COST				**$82,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-4	
Alternative 4 **Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring**	**SCREENING COST ESTIMATE SUMMARY**

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 4 uses a remedial strategy that emphasizes iremoval and offsite disposal of contaminated soil, institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Removal along with offsite disposal of contaminated soil would be conducted within the west embankments of Highway 37 and within area surrounding sample 1-03000. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the existing cover systems (placed during the interim remedial actions) as well as newly-backfilled areas and existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

SITE MAINTENANCE AND INSPECTION ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 2 through 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Maintenance	1	LS	$15,000	$15,000	Includes maintenance of the remedy put in place
Annual Inspection	1	YR	$2,000	$2,000	Includes inspection of the remedy put in place
SUBTOTAL				$17,000	
Contingency (Scope and Bid)	20%			$3,400	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$20,400	
Project Management	10%			$2,040	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,060	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$25,500	
TOTAL PERIODIC COST				**$26,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEWS PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$30,000	$30,000	Includes site inspection and 5-year review report
Community Awareness Activities	1	LS	$5,000	$5,000	Includes public notification and meetings associated with 5-year site review
SUBTOTAL				$35,000	
Contingency (Scope and Bid)	20%			$7,000	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$42,000	
Project Management	10%			$4,200	The high end of the recommended range in EPA 540-R-00-002 was used.
Technical Support	15%			$6,300	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$52,500	
TOTAL PERIODIC COST				**$53,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

CY	Cubic Yard
LF	Linear Feet
LS	Lump Sum
QTY	Quantity
YR	Year

TABLE SCS-5

Alternative **5**

Removal of Contaminated Soil within the Flyway Subarea, Offsite Thermo-Chemical Treatment and Reuse of Treated Material, Institutional and Engineered Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 5 uses a remedial strategy that emphasizes removal and offsite treatment of contaminated soil, institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Removal along with offsite disposal of contaminated soil would be conducted within the west embankments of Highway 37 and within area surrounding sample 1-03000. The excavated contaminated soil would be treated at an offsite facility that demineralizes asbestos fibers using thermo-chemical conversion. Excavated areas would be backfilled with uncontaminated material (clean soil) along with treated inert material. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the existing cover systems (placed during the interim remedial actions) as well as newly-backfilled areas and existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	1	LS	$35,000	$35,000	Institutional controls for OU2 site
Engineered Controls	3,330	LF	$30	$99,900	Includes fencing and warning signage around the seasonally flooded areas
SUBTOTAL				$134,900	
Contingency (Scope and Bid)	20%			$26,980	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$161,880	
Project Management	8%			$12,950	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	15%			$24,282	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	10%			$16,188	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$24,282	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$239,582	
TOTAL CAPITAL COST				**$240,000**	Total capital cost is rounded to the nearest $1,000.

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Removal and Transport of Contaminated Soils	640	CY	$100	$64,000	Includes site clearing, mob/demob, removal and waste transportation to treatment facility
Treatment of Contaminated Soils	775	TN	$470	$364,250	Includes waste treatment using a thermo-chemical process
SUBTOTAL				$428,250	
Contingency (Scope and Bid)	20%			$85,650	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$513,900	
Project Management	6%			$30,834	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design	12%			$61,668	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management	8%			$41,112	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$77,085	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$724,599	
TOTAL CAPITAL COST				**$725,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-5

Alternative 5

Removal of Contaminated Soil within the Flyway Subarea, Offsite Thermo-Chemical Treatment and Reuse of Treated Material, Institutional and Engineered Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 5 uses a remedial strategy that emphasizes removal and offsite treatment of contaminated soil, institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Removal along with offsite disposal of contaminated soil would be conducted within the west embankments of Highway 37 and within area surrounding sample 1-03000. The excavated contaminated soil would be treated at an offsite facility that demineralizes asbestos fibers using thermo-chemical conversion. Excavated areas would be backfilled with uncontaminated material (clean soil) along with treated inert material. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the existing cover systems (placed during the interim remedial actions) as well as newly-backfilled areas and existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

SITE MAINTENANCE AND INSPECTION ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 2 through 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Maintenance	1	LS	$15,000	$15,000	Includes maintenance of the remedy put in place
Annual Inspection	1	YR	$2,000	$2,000	Includes inspection of the remedy put in place
SUBTOTAL				$17,000	
Contingency (Scope and Bid)	20%			$3,400	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$20,400	
Project Management	10%			$2,040	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support	15%			$3,060	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$25,500	
TOTAL PERIODIC COST				**$26,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEWS PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$30,000	$30,000	Includes site inspection and 5-year review report
Community Awareness Activities	1	LS	$5,000	$5,000	Includes public notification and meetings associated with 5-year site review
SUBTOTAL				$35,000	
Contingency (Scope and Bid)	20%			$7,000	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL				$42,000	
Project Management	10%			$4,200	The high end of the recommended range in EPA 540-R-00-002 was used.
Technical Support	15%			$6,300	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL				$52,500	
TOTAL PERIODIC COST				**$53,000**	Total capital cost is rounded to the nearest $1,000.

Notes:

Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

CY	Cubic Yard
LF	Linear Feet
LS	Lump Sum
QTY	Quantity
TN	Ton
YR	Year

Appendix E

Monitoring Protocol for Retained Alternatives

TABLE E-1

DETAILED MONITORING PROTOCOLS FOR RETAINED ALTERNATIVES

Alternative	Assumed Land Use	Active General Response Action Components							Monitoring Requirements			
		No Action	Institutional Controls	Engineered Controls	Containment	Removal, Transport and Disposal			Inspection and Sampling			5-Yr Site Review
					Cover	Removal	Offsite Transport	Offsite Disposal	Borrow Source Sampling	Removal Confirmatory Sampling	Visual Remedy Component Inspections	5-Yr Review Site Inspection
Alternative 1	Commercial and/or Residential	✓										✓
Alternative 2			✓	✓							✓	✓
Alternative 3a			✓	✓	✓				✓		✓	✓
Alternative 3b			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note:
Alternative 1: No Action
Alternative 2: Institutional and Engineered Controls with Monitoring
Alternative 3a: In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring
Alternative 3b: In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Description of the various monitoring activities are presented in Section 2.5 of the FS.

No Action	Discontinue all current remedial activities and no further action would be initiated at the site to address contaminated soil or otherwise mitigate the associated risks to human health or the environment.
Institutional Controls	All alternatives except Alternative 1 (No Action) to be addressed as needed by institutional controls (governmental controls, proprietary controls, and/or informational devices) to protect the remedy put in place.
Engineered Controls	All alternatives except Alternative 1 (No Action) to be addressed by engineered controls (fencing and warning signs) to protect the remedy put in place and exclude access and unacceptable uses of the site by receptors.
Cover	Contaminated surface soil within the west embankments of Highway 37 and within the area surrounding sample location 1-03000 at OU2 would be covered (12" of subsoil and 6" of topsoil) using a clean offsite borrow source area outside of the Libby valley.
Removal	Contaminated surface soil and within area surrounding sample location 1-03000 at OU2 site would be initially excavated to a depth of 1 foot bgs and then backfilled with clean backfill (soil) from an offsite borrow source area outside of Libby valley.
Offsite Transport/Disposal	All the removed contaminated soil would be transported and disposed of at the Former Libby Vermiculite Mine.
Borrow Sampling	Used to determine whether asbestos fibers or any other contaminants are present in proposed borrow source. One 30-point composite sample (PLM, Stereomicroscopy analysis) for every 10,000 cubic yards of borrow material.
Removal Confirmatory Sampling	Used to determine whether LA is present in excavation floor. Assume 1 sampling event at each excavation, one 30-point composite sample (PLM, Stereomicroscopy analysis) for every 15,000 square feet of excavation or a minimum of one sample per excavation. This would be perfomed initially at the 1 foot depth, and as needed for every 6 inch lift that indicates LA above 1%.
Visual Remedy Component Inspections	Visual inspection would be conducted annually to check the integrity of the remedial components of the remedy put in place.
5-Yr Review Site Inspection	5-yr site inspection used per NCP to document changes in site conditions that affect protectiveness. 1 inspection event during every 5-yr period. The inspection will also include inspecting the integrity of all the remedial components of the remedy put in place to determine protectiveness.

Appendix F

Detailed Analysis of Retained Alternatives

The detailed evaluation and analysis of each alternative is assessed using the two threshold criteria and five balancing criteria are presented in the following Appendix F. The common justifications have been indicated using gray text to allow the reader to focus on the differences between alternatives.

Alternative 1
No Action

Table F-1. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 1

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ Contaminated surface and subsurface soil on the site was largely addressed during previous interim remedial actions through removal and offsite disposal and/or in-place containment with covers. ■ Remaining contaminated surface soil present in the west embankments of Highway 37 and the area surrounding sample location 1-03000 within the Flyway Subarea is left unaddressed. ■ Unaddressed contaminated soil allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water) if disturbed. ■ If existing covers are disturbed, contaminated soil could liberate asbestos fibers to air and potentially represent an inhalation exposure risk to human receptors. ■ Soil within seasonally flooded areas of the Flyway Subarea has not been investigated or characterized. Since these areas are left unaddressed, they could potentially pose an exposure risk to human or ecological receptors if contaminated. ■ The Kootenai River is adjacent to the Screening Plant and Flyway Subareas. If flooding is significant, erosion of covers adjacent to the riverbank could potentially cause migration of contaminated soil to surface water. Contaminated soil transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ■ PRAOs are unaddressed.

Table F-2. Evaluation Summary for Compliance with ARARs – Alternative 1

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with Chemical-Specific ARARs	■ No further action is taken to address contaminated soil. Presence of unaddressed contaminated soil may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air; thus this criterion is not met.
Compliance with Location-Specific ARARs	■ No further action is taken to address contaminated soil; thus this criterion is not met.
Compliance with Action-Specific ARARs	■ Action-specific ARARs are not triggered since no further remedial measures would be undertaken.

Table F-3. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 1

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ No further remedial action would be undertaken to address contaminated soil. ■ Contaminated subsurface soil would be left in-place below the covers placed during interim remedial actions; however lack of future cover O&M may allow contamination to become re-exposed to human receptors and environment. ■ Contaminated surface soil not addressed during previous interim remedial actions would be left exposed to human receptors and environment.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	■ No controls are put in place under the "no action" alternative; thus, the only controls are those put in during previous interim remedial actions. ■ The controls placed during previous interim remedial actions (clean soil cover over contaminated soil and riprap along the river bank) could be compromised in the future if left unmaintained and unmonitored. ■ Asbestos fibers from the unaddressed contaminated soil could migrate to other media and could pose unacceptable risks to human health and the environment.

Table F-4. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 1

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	■ This alternative does not treat contaminated soil; thus there is no reduction of toxicity, mobility, or volume of contamination through treatment. ■ The statutory preference for treatment as a principal element of the remedial action is not met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table F-5. Short-Term Effectiveness Evaluation Summary – Alternative 1

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ The alternative only includes monitoring (site inspections) during 5-year site reviews. Implementation of monitoring does not pose additional short-term risks to the community.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ Workers performing monitoring (site inspections) during 5-year site reviews would potentially be exposed to asbestos fibers released from the contaminated soil that pose unacceptable risks. ■ These risks can be mitigated through the use of control measures and personal protective equipment.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ No further remedial action other than monitoring would be undertaken, thus, there are no potential adverse impacts resulting from implementation of the alternative.
Time until protection is achieved	■ No further remedial action would be undertaken to address contaminated soil; thus protection is not achieved under this alternative.

Table F-6. Implementability Evaluation Summary – Alternative 1

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ Under this alternative no further remedial action would be undertaken to address contaminated soil. ■ Site inspections, which are part of Alternative 1 would be performed during 5-year reviews and could be easily implemented with available labor, material and technical resources.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	
	Ease of undertaking additional remedial actions including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	
Administrative Feasibility	Activities needed to coordinate with other offices and agencies	■ No remedial action would be undertaken to address the site other than monitoring; approvals from other regulatory agencies to perform monitoring should be easily obtainable.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ No offsite remedial activities would be conducted under this alternative.
Availability of Services and Materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ No further remedial action would be undertaken, thus this criterion is not applicable.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources	■ Technical specialists and equipment are available for conducting inspections during 5-year site reviews.
	Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies	
	Availability of prospective technologies	

Table F-7. Cost Evaluation Summary – Alternative 1

Evaluation Factors for Cost	Approx. Cost (Dollars)
Total Capital Cost	None
Total Annual O&M Cost	None
Total Periodic Cost	$288,000
Total Cost (Excluding Present Value Discounting)	$288,000
Total Present Value Cost	$104,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30).
Costs are rounded to the nearest $1,000.

Alternative 2
Institutional and Engineered Controls with Monitoring

Table F-8. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 2

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ Contaminated surface and subsurface soil on the site was largely addressed during previous interim remedial actions through removal and offsite disposal and/or in-place containment with covers. ■ Institutional controls and engineered controls would be implemented to exclude access and unacceptable uses of the site by human receptors, including contaminated soil previously covered under interim remedial actions and soil within seasonally flooded areas of the Flyway Subarea that has not been investigated or characterized. ■ Contaminated surface soil present in the west embankments of Highway 37 would be addressed primarily by institutional controls. ■ Contaminated soil surrounding sample location 1-03000 within the Flyway Subarea would be addressed by institutional and engineered controls. ■ Since these two locations are not physically addressed, this alternative could allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water). ■ Existing containment over contaminated soil (covers placed during the interim remedial actions) would eliminate continued release and migration of asbestos fibers to unimpacted media (primarily soil and air) and would eliminate inhalation exposure risks from asbestos fibers to human receptors. ■ Long-term protection to human health and environment is not ensured since contaminated soil potentially posing a risk is left on site beneath the covers placed during the interim remedial actions; if covers are compromised the contaminated soil could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air). ■ The Kootenai River is adjacent to the Screening Plant and Flyway Subareas. If flooding is significant, erosion of covers adjacent to the riverbank could potentially cause migration of contaminated soil to surface water. Contaminated soil transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ■ Long-term effectiveness and permanence of the engineered controls, and existing covers and riprap is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the remedy is dependent on administrative and legal enforcement of the institutional controls. ■ Monitoring would be required for effectiveness of the remedy through periodic inspections of the engineered controls and existing cover for integrity and adherence to institutional controls. ■ PRAOs are addressed under this alternative through engineered controls, institutional controls, and monitoring.

Table F-9. Evaluation Summary for Compliance with ARARs – Alternative 2

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with Chemical-Specific ARARs	■ Institutional and engineered controls do not physically address migration of site contamination; presence of unaddressed contaminated soil may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air.
Compliance with Location-Specific ARARs	■ Location-specific ARARs for the remedy would be addressed during implementation of the remedial action.
Compliance with Action-Specific ARARs	■ Action-specific ARARs for the remedy would be addressed during implementation of the remedial action. Specifically, as per EPA's determination the signage and fencing requirements specified under NESHAP (40 CFR 61.151) are a potential consideration as a relevant and appropriate ARARs for the site and would be in compliance with this ARAR as allowed under 40 CFR 61.151(b).

Table F-10. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 2

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ Contaminated surface soil present in the west embankments of Highway 37 and the area surrounding sample location 1-03000 within the Flyway Subarea are left physically unaddressed and could allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water) and would pose inhalation exposure risks from asbestos fibers to human receptors. ■ Existing containment over contaminated soil (covers placed during the interim remedial actions) would eliminate continued release and migration of asbestos fibers to unimpacted media (primarily soil and air) and would eliminate inhalation exposure risks from asbestos fibers to human receptors. ■ Existing riprap protection along the riverbank would protect the remedy put in place and to prevent the erosion of underlying contaminated soil. ■ Long-term protection to human health and environment is not entirely ensured since contaminated soil potentially posing a risk is left on site beneath the covers placed during the interim remedial actions; if covers are compromised the contaminated soil could allow continued release and migration of asbestos fibers to unimpacted media (primarily soil and air).
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site.	■ Engineered controls are a reliable control if properly monitored and maintained. Reliability can only be ensured if institutional controls are strictly enforced. ■ Long-term effectiveness and permanence is not entirely ensured since contaminated soil exists beneath the covers and within the west embankments of Highway 37 and the area surrounding sample location 1-03000, and could also potentially exist within the seasonally flooded areas of the Flyway Subarea. ■ The Kootenai River may erode the riverbank, especially during large flows, which could potentially cause migration of contaminated soil to surface water over time if O&M of existing covers is not performed. ■ Long-term effectiveness and permanence of the existing covers and engineered controls is dependent on periodic inspection and O&M to repair erosion or other damage to the covers and fencing. ■ Although institutional controls will be implemented, adequacy and reliability of institutional controls is dependent on administrative and legal enforcement of the controls. ■ Monitoring would be required for effectiveness of the remedy through periodic inspections of the engineered controls and cover for integrity and adherence to institutional controls.

Table F-11. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 2

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	■ This alternative does not treat the contaminated soil; thus there is no reduction of toxicity, mobility, or volume of contamination through treatment. ■ The statutory preference for treatment as a principal element of the remedial action is not met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table F-12. Short-Term Effectiveness Evaluation Summary – Alternative 2

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ The alternative involves limited disturbance of contaminated soil, which would pose minimal short-term risks to the community living close to the site from inhalation of asbestos fibers. ■ Safety measures such as dust suppression and establishment of work zones (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ Short-term risks posed to the community during implementation of the alternative (after implementing protective controls and measures) relate to trespassers within the exclusion zone and fenced areas.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ The alternative involves disturbance of contaminated soil, which could pose short-term risks to workers from inhalation of asbestos fibers. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers during implementation. ■ Other potential impacts can be from safety hazards during remedial implementation, such as falls, electrical hazards, and mechanical hazards. ■ These other potential impacts would be mitigated through adherence to safety requirements and standard operating procedures.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ Short-term impacts to the Kootenai River could occur during implementation, especially along the riverbank. ■ Protective measures, such as dust suppression (water- or chemical-based) and other erosion prevention measures would be used for minimizing the environmental impacts during construction.
Time until protection is achieved	■ The proposed remedial action and institutional controls could be implemented in less than 6 months.

Table F-13. Implementability Evaluation Summary – Alternative 2

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ Engineered controls such as fencing and warning signs can be easily constructed; however, source control measures, such as dust suppression (water- or chemical-based) and PPE, would be required to protect human receptors and the environment from release of asbestos fibers and to meet ARARs. ■ Implementation of monitoring is relatively straightforward and can be easily implemented. ■ Institutional controls could be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	■ Engineered controls such as fencing and warning signs could be easily constructed using available technology. ■ Construction of engineered controls within the seasonally flooded areas could be reliably performed using available technology; however unforeseen weather conditions (especially high river stages) could potentially cause schedule delays. ■ Implementation of monitoring is relatively straightforward to implement and reliably operate. ■ Implementation of institutional controls could be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2. Difficulties with institutional controls may lead to potential schedule delays.
	Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	■ Installation of additional engineered controls (fencing and/or warning signs) could be implemented with relative ease if required in the future. ■ Monitoring can be easily implemented. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	■ A comprehensive inspection, monitoring, and maintenance program would be implemented to maintain the integrity of the existing cover systems placed during the interim remedial actions and existing and newly-constructed engineered controls. ■ Inspection, maintenance, and replacement of engineered controls, soil cover systems and erosion control systems (i.e. riprap) along the river could be easily implemented using available materials, equipment, and labor resources. ■ Monitoring can be easily implemented. ■ Frequent/periodic monitoring (inspections) would be required to monitor effectiveness of the remedy. ■ Contaminated soil potentially posing a risk is left on site beneath the covers placed during the interim remedial actions; if covers are compromised the contaminated soil could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air).

Table F-13. Implementability Evaluation Summary – Alternative 2 (continued)

Evaluation Factors for Implementability		Evaluation Summary
Administrative Feasibility	Activities needed to coordinate with other offices and agencies	■ Regulatory approvals for engineered controls should be obtainable. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ No offsite remedial activities would be conducted under this alternative.
Availability of Services and Materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ This alternative does not require treatment, storage and disposal services; thus, this criterion is not applicable.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources	■ The property for implementing the remedial action has already been obtained. ■ Labor, equipment and material for engineered controls (fence and signs) construction are available. ■ Materials, equipment and labor resources used for institutional controls and monitoring are easily obtainable. ■ Technical specialists and equipment are available for implementation of the remedy.
	Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies	
	Availability of prospective technologies	

Table F-14. Cost Evaluation Summary – Alternative 2

Evaluation Factors for Cost	Approx. Cost (Dollars)
Total Capital Cost	$261,000
Total Annual O&M Cost	$696,000
Total Periodic Cost	$288,000
Total Cost (Excluding Present Value Discounting)	$1,245,000
Total Present Value Cost	$623,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30).
Costs are rounded to the nearest $1,000.

Alternative 3a

In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

Table F-15. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 3a

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ Contaminated surface and subsurface soil on the site was largely addressed during previous interim remedial actions through removal and offsite disposal and/or in-place containment with covers. ■ Institutional controls and engineered controls would be implemented to exclude access and unacceptable uses of the site by human receptors, including contaminated soil previously covered under interim remedial actions and soil within seasonally flooded areas of the Flyway Subarea that has not been investigated or characterized. ■ Contaminated surface soil present in the west embankments of Highway 37 would be addressed through in-place containment (soil cover), institutional controls, and monitoring. ■ Contaminated soil surrounding sample location 1-03000 within the Flyway Subarea would be addressed through in-place containment (soil cover), institutional and engineered controls, and monitoring. ■ Existing containment over contaminated soil (covers placed during the interim remedial actions) would eliminate continued release and migration of asbestos fibers to unimpacted media (primarily soil and air) and would eliminate inhalation exposure risks from asbestos fibers to human receptors. ■ Long-term protection to human health and environment is not ensured since contaminated soil potentially posing a risk is left on site beneath the covers; if covers are compromised the contaminated soil could allow continued release and migration of asbestos fibers to unimpacted media (primarily soil and air). ■ The Kootenai River is adjacent to the Screening Plant and Flyway Subareas. If flooding is significant, erosion of covers adjacent to the riverbank could potentially cause migration of contaminated soil to surface water. Contaminated soil transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ■ Long-term effectiveness and permanence of the engineered controls, covers and riprap is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the remedy is dependent on administrative and legal enforcement of the institutional controls. ■ Institutional controls would be implemented to prevent unacceptable uses of the site by human receptors which could impact effectiveness of the covers and engineered controls. ■ Monitoring would be required for effectiveness of the remedy through periodic inspections of the engineered controls and covers for integrity and adherence to institutional controls. ■ PRAOs are addressed under this alternative through in-place containment of contaminated soil, engineered controls, institutional controls, and monitoring.

Table F-16. Evaluation Summary for Compliance with ARARs – Alternative 3a

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with Chemical-Specific ARARs	■ Contaminated surface soil contained in-place with covers would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air. ■ Institutional and engineered controls do not physically address migration of site contamination; presence of unaddressed contaminated soil may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air.
Compliance with Location-Specific ARARs	■ Location-specific ARARs for the remedy would be addressed during implementation of the remedial action.
Compliance with Action-Specific ARARs	■ Action-specific ARARs for the remedy would be addressed during implementation of the remedial action. Specifically, as per EPA's determination the cover and signage and fencing requirements specified under NESHAP (40 CFR 61.151) are a potential consideration as a relevant and appropriate ARARs for the site and would be in compliance with this ARAR as allowed under 40 CFR 61.151(c) and 40 CFR 61.151(b), respectively.

Table F-17. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 3a

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ Protective covers placed within the west embankments of Highway 37 and the area surrounding sample location 1-03000 within the Flyway Subarea, as well as covers placed during the interim remedial action over the contaminated soil would eliminate continued release and migration of asbestos fibers to unimpacted media (primarily soil and air) and would eliminate inhalation exposure risks from asbestos fibers to human receptors. ■ Existing riprap protection along the riverbank would protect the remedy put in place and to prevent the erosion of underlying contaminated soil. ■ Long-term protection to human health and environment is not entirely ensured since contaminated soil potentially posing a risk are left on site beneath the covers; if covers are compromised the contaminated soil could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air). ■ Seasonally flooded areas of Flyway Subarea are addressed through institutional and engineered controls. These areas have not been investigated or characterized for risk, thus could potentially pose an exposure risk to human or ecological receptors if contaminated.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site.	■ In-place containment of contaminated soil using covers is a reliable control if properly maintained. ■ Engineered controls are a reliable control if properly monitored and maintained. Reliability can only be ensured if institutional controls are strictly enforced. ■ Long-term effectiveness and permanence is not entirely ensured since contaminated soil exists beneath the covers and could also potentially exist within the seasonally flooded areas of the Flyway Subarea. ■ Long-term effectiveness and permanence of the covers (including covers placed during the interim remedial actions), engineered controls and existing riprap is dependent on periodic inspection and O&M to repair erosion or other damage. ■ Although institutional controls will be implemented, adequacy and reliability of institutional controls is dependent on administrative and legal enforcement of the controls. ■ Monitoring would be required for effectiveness of the remedy through periodic inspections of the engineered controls and cover for integrity and adherence to institutional controls.

Table F-18. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 3a

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	■ This alternative does not treat the contaminated soil; thus there is no reduction of toxicity, mobility, or volume of contamination through treatment. ■ The statutory preference for treatment as a principal element of the remedial action is not met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table F-19. Short-Term Effectiveness Evaluation Summary – Alternative 3a

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ The alternative involves disturbance of contaminated soil, which could pose short-term risks to the community living close to the site from inhalation of asbestos fibers. ■ Short-term risks to the community may be posed by construction of covers within the Highway 37 right-of-way. Measures such as temporary lane closures may be required over the period of cover construction. ■ Safety measures such as dust suppression and establishment of work zones (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ Short-term risks posed to the community during implementation of the alternative (after implementing protective controls and measures) relate to trespassers within the exclusion zone.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ The alternative involves disturbance of contaminated soil, which could pose short-term risks to workers from inhalation of asbestos fibers. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers during implementation. ■ Other potential impacts can be from safety hazards during remedial implementation, such as falls, electrical hazards, and mechanical hazards..These other potential impacts would be mitigated through adherence to safety requirements and standard operating procedures.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ Short-term impacts to the Kootenai River could occur during implementation, especially along the riverbank. ■ Protective measures, such as dust suppression (water- or chemical-based) and other erosion prevention measures would be used for minimizing the environmental impacts during construction.
Time until protection is achieved	■ The proposed remedial action and institutional controls could be implemented in less than 1 year.

Table F-20. Implementability Evaluation Summary – Alternative 3a

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ In-place containment with covers for contaminated soil and engineered controls such as fencing and warning signs could be easily constructed; however, source control measures, such as dust suppression (water- or chemical-based) and PPE, would be required to protect human receptors and the environment from release of asbestos fibers and to meet ARARs. ■ Traffic control measures would be required due the site's proximity to Highway 37. ■ Implementation of monitoring is relatively straightforward and can be easily implemented. ■ Institutional controls could be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	■ In-place containment of contaminated surface soil with covers and engineered controls such as fencing and warning signs could be easily constructed using available technology. ■ Suitable uncontaminated materials for soil cover construction are not available onsite. Soil cover construction materials would be required from offsite source(s) outside of the Libby valley which could delay the schedule. ■ Construction of engineered controls within the seasonally flooded areas could be reliably performed using available technology; however unforeseen weather conditions (especially high river stages) could potentially cause schedule delays. ■ Implementation of monitoring is relatively straightforward to implement and reliably operate. ■ Implementation of institutional controls could be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2. Difficulties with institutional controls may lead to potential schedule delays.
	Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	■ Placing additional soil cover could be implemented with relative ease if required in the future. However difficulties may be posed by placement of additional soil covers within the Highway 37 right-of-way. Measures such as temporary lane closures may be required over the period of cover construction. ■ Installation of additional engineered controls (fencing and/or warning signs) could be implemented with relative ease if required in the future. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.

Table F-20. Implementability Evaluation Summary – Alternative 3a (continued)

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility – Continued	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	■ A comprehensive inspection, monitoring, and maintenance program would be implemented to maintain the integrity of the cover systems (including covers placed during interim remedial actions) and existing and newly-constructed engineered controls. ■ Inspection, maintenance, and replacement of the soil cover systems (including covers placed during interim remedial action), engineered controls and existing erosion control systems (i.e. riprap) along the river could be easily implemented using available materials, equipment, and labor resources. ■ Monitoring can be easily implemented. ■ Frequent/periodic monitoring (inspections) would be required to monitor effectiveness of the remedy and detect failures of covers. ■ Contaminated soil potentially posing a risk is left on site beneath the covers placed during the interim remedial actions; if covers are compromised the contaminated soil could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air).
Administrative Feasibility	Activities needed to coordinate with other offices and agencies	■ Regulatory approval for engineered controls should be obtainable. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented. ■ Approval from Montana Department of Transportation (MDT) would be needed before covering contaminated soil within the Highway 37 embankments, and coordination with MDT would be needed during implementation.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ Use of offsite borrow source(s) outside of the Libby valley for cover materials would require coordination and approval.
Availability of Services and Materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ This alternative does not require treatment, storage and disposal services; thus, this criterion is not applicable.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies Availability of prospective technologies	■ The property for implementing the remedial action has already been obtained. ■ Labor, equipment and material for cover construction are available. ■ Suitable cover construction materials would be required from offsite source(s) outside of the Libby valley but are available. ■ Total volume of suitable cover material required is approximately 960 cubic yards; approximately 35 truck loads would be required to haul in the suitable material. ■ Materials, equipment, and labor resources used for institutional/engineered controls and monitoring are easily obtainable. ■ Technical specialists and equipment are available for implementation of the remedy.

Table F-21. Cost Evaluation Summary – Alternative 3a

Evaluation Factors for Cost	Approx. Cost (Dollars)
Total Capital Cost	$323,000
Total Annual O&M Cost	$696,000
Total Periodic Cost	$288,000
Total Cost (Excluding Present Value Discounting)	$1,307,000
Total Present Value Cost	$681,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30).
Costs are rounded to the nearest $1,000.

Alternative 3b

In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Table F-22. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 3b

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	▪ Contaminated surface and subsurface soil on the site was largely addressed during previous interim remedial actions through removal and offsite disposal and/or in-place containment with covers. ▪ Institutional controls and engineered controls would be implemented to exclude access and unacceptable uses of the site by human receptors, including contaminated soil previously covered under interim remedial actions and soil within seasonally flooded areas of the Flyway Subarea that has not been investigated or characterized. ▪ Contaminated surface soil present in the west embankments of Highway 37 would be addressed through in-place containment (soil cover), institutional controls, and monitoring. ▪ Contaminated soil surrounding sample location 1-03000 within the Flyway Subarea would be addressed through removal (excavation) and offsite disposal at the Former Libby Vermiculite Mine, institutional and engineered controls, and monitoring. ▪ Existing containment over contaminated soil (covers placed during the interim remedial actions) would eliminate continued release and migration of asbestos fibers to unimpacted media (primarily soil and air) and would eliminate inhalation exposure risks from asbestos fibers to human receptors. ▪ Long-term protection to human health and environment is not ensured since contaminated soil potentially posing a risk are left on site beneath the covers and backfilled areas; if these are compromised the contaminated soil could allow continued release and migration of asbestos fibers to unimpacted media (primarily soil and air). ▪ The Kootenai River is adjacent to the Screening Plant and Flyway Subareas. If flooding is significant, erosion of covers adjacent to the riverbank could potentially cause migration of contaminated soil to surface water. Contaminated soil transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ▪ Long-term effectiveness and permanence of the engineered controls, covers, and riprap is dependent on periodic inspection and O&M. ▪ Long-term effectiveness and permanence of the remedy is dependent on administrative and legal enforcement of the institutional controls. ▪ Institutional controls would be implemented to prevent unacceptable uses of the site by human receptors which could impact effectiveness of the covers and engineered controls. ▪ Monitoring would be required for effectiveness of the remedy through periodic inspections of the engineered controls and covers for integrity and adherence to institutional controls. ▪ PRAOs are addressed under this alternative through in-place containment of contaminated soil, removal of contaminated soil, engineered controls, institutional controls, and monitoring.

Table F-23. Evaluation Summary for Compliance with ARARs – Alternative 3b

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with Chemical-Specific ARARs	■ Contaminated surface soil contained in-place with covers along with removal of contaminated soil and offsite disposal coupled with backfilled excavations would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air. ■ Institutional and engineered controls do not physically address migration of site contamination; presence of unaddressed contaminated soil may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air.
Compliance with Location-Specific ARARs	■ Location-specific ARARs for the remedy would be addressed during implementation of the remedial action.
Compliance with Action-Specific ARARs	■ Action-specific ARARs for the remedy would be addressed during implementation of the remedial action. Specifically, as per EPA's determination the cover and signage and fencing requirements specified under NESHAP (40 CFR 61.151) are a potential consideration as a relevant and appropriate ARARs for the site and would be in compliance with this ARAR as allowed under 40 CFR 61.151(c) and 40 CFR 61.151(b), respectively.

Table F-24. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 3b

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ Protective covers placed within the west embankments of Highway 37, limited removal and offsite disposal of contaminated soil within the area surrounding sample location 1-03000 and covers placed during the interim remedial action over the contaminated soil would eliminate continued release and migration of asbestos fibers to unimpacted media (primarily soil and air) and would eliminate inhalation exposure risks from asbestos fibers to human receptors. ■ Existing riprap protection along the riverbank would protect the remedy put in place and to prevent the erosion of underlying contaminated soil. ■ Long-term protection to human health and environment is not entirely ensured since contaminated soil potentially posing a risk are left on site beneath the covers and backfilled areas; and if compromised the contaminated soil could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air). ■ Seasonally flooded areas of the site are addressed through institutional and engineered controls. These areas have not been investigated or characterized for risk, thus could potentially pose an exposure risk to human or ecological receptors.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site.	■ In-place containment of contaminated soil using covers and removal with offsite disposal of contaminated soil coupled with backfilling excavations with clean soil is a reliable control if properly maintained. ■ Engineered controls are a reliable control if properly monitored and maintained. Reliability can only be ensured if institutional controls are strictly enforced. ■ Long-term effectiveness and permanence is not entirely ensured since contaminated soil exists beneath the covers, backfilled areas, and could also potentially exist within the seasonally flooded areas of the Flyway Subarea. ■ Long-term effectiveness and permanence of the covers (including covers placed during interim remedial actions), backfilled areas, engineered controls and existing riprap is dependent on periodic inspection and O&M to repair erosion or other damage. ■ Although institutional controls will be implemented, adequacy and reliability of institutional controls is dependent on administrative and legal enforcement of the controls. ■ Monitoring would be required for effectiveness of the remedy through periodic inspections of the engineered controls and cover/ backfilled areas for integrity and adherence to institutional controls.

Table F-25. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 3b

<table>
<tr><th>Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment</th><th>Evaluation Summary</th></tr>
<tr><td>The treatment processes, the alternative uses, and materials they will treat</td><td rowspan="6">■ This alternative does not treat the contaminated soil; thus there is no reduction of toxicity, mobility, or volume of contamination through treatment.
■ The statutory preference for treatment as a principal element of the remedial action is not met.</td></tr>
<tr><td>The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed</td></tr>
<tr><td>The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment</td></tr>
<tr><td>The degree to which the treatment is irreversible</td></tr>
<tr><td>The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents</td></tr>
<tr><td>Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action</td></tr>
</table>

Table F-26. Short-Term Effectiveness Evaluation Summary – Alternative 3b

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ The alternative involves disturbance of contaminated soil, which could pose short-term risks to the community living close to the site from inhalation of asbestos fibers. ■ Short-term risks to the community may be posed by construction of covers within the Highway 37 right-of-way. Measures such as temporary lane closures may be required over the period of cover construction. ■ Short-term risks to the community may be posed by transport of contaminated soil across Highway 37 to the former Libby Vermiculite Mine for disposal. Measures such as temporary lane closures may be required over the period of contaminated soil hauling. ■ Safety measures such as dust suppression and establishment of work zones (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ■ Short-term risks posed to the community during implementation of the alternative (after implementing protective controls) and measures relate to trespassers within the exclusion zone.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ The alternative involves disturbance of contaminated soil, which could pose short-term risks to workers from inhalation of asbestos fibers. ■ Offsite transportation and disposal of contaminated soil at the Former Libby Vermiculite Mine would pose short-term risks to the workers. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers during implementation. ■ Other potential impacts can be from safety hazards during remedial implementation, such as falls, electrical hazards, and mechanical hazards. ■ These other potential impacts would be mitigated through adherence to safety requirements and standard operating procedures.

Table F-26. Short-Term Effectiveness Evaluation Summary – Alternative 3b (continued)

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ There would be short-term impacts as contaminated soil would be transported and disposed of offsite at the Former Libby Vermiculite Mine. ■ Use of standard procedures for transport and handling of contaminated soil at the mine would mitigate risks to the environment. ■ Short-term impacts to the Kootenai River could occur during implementation, especially along the riverbank. ■ Protective measures, such as dust suppression (water- or chemical-based) and other erosion prevention measures would be used for minimizing the environmental impacts during construction.
Time until protection is achieved	■ The proposed remedial action and institutional controls could be implemented in less than 1 year.

Table F-27. Implementability Evaluation Summary – Alternative 3b

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ In-place containment with covers for contaminated soil, removal and offsite disposal of contaminated soil coupled with backfilling of excavations, and engineered controls such as fencing and warning signs could be easily constructed; however, source control measures, such as dust suppression (water- or chemical-based) and PPE, would be required to protect human receptors and the environment from release of asbestos fibers and to meet ARARs. ■ Traffic control measures would be required due the site's proximity to Hwy 37. ■ Implementation of monitoring is relatively straightforward and can be easily implemented. ■ Institutional controls could be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	■ In-place containment of contaminated surface soil with covers, removal and disposal of contaminated soil, and engineered controls such as fencing and warning signs could be easily constructed using available technology. ■ Suitable uncontaminated materials for soil cover construction and backfilling of excavations are not available onsite. Soil cover construction and backfill materials would be required from offsite source(s) outside of the Libby valley which could delay the schedule. ■ Removed contaminated soil would require transportation for offsite disposal in enclosed trucks. ■ Construction of engineered controls within the seasonally flooded areas could be reliably performed using available technology; however unforeseen weather conditions (especially high river stages) could potentially cause schedule delays. ■ Implementation of monitoring is relatively straightforward to implement and reliably operate. ■ Implementation of institutional controls could be challenging for the site since portions of the property are under private ownership. Difficulty is also dependent on the types of administrative and/or legal instruments proposed for OU2. Difficulties with institutional controls may lead to potential schedule delays.

Table F-27. Implementability Evaluation Summary – Alternative 3b (continued)

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility - continued	Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	■ Placing additional soil cover or backfill material or other remedial actions such as additional soil removal could be implemented with relative ease if required in the future. However difficulties may be posed by placement of additional soil covers within the Highway 37 right-of-way. Measures such as temporary lane closures may be required over the period of cover construction. ■ Installation of additional engineered controls (fencing and/or warning signs) could be implemented with ease if required in the future. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	■ A comprehensive inspection, monitoring, and maintenance program would be implemented to maintain the integrity of the cover systems (including covers placed during interim remedial action), backfilled areas, and existing and newly-constructed engineered controls. ■ Contaminated soil disposed offsite at the Former Libby Vermiculite Mine would be monitored as part of the Mine Site OU (OU3). ■ Inspection, maintenance, and replacement of the soil cover systems (including covers placed during interim remedial action), backfilled areas, engineered controls and existing erosion control systems (i.e. riprap) along the river could be easily implemented using available materials, equipment, and labor resources. ■ Monitoring can be easily implemented. ■ Frequent/periodic monitoring (inspections) would be required to monitor effectiveness of the remedy and detect failures of covers and backfilled areas. ■ Contaminated soil potentially posing a risk is left on site beneath the covers and backfilled areas; if covers are compromised the contaminated soil could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air).
Administrative Feasibility	Activities needed to coordinate with other offices and agencies	■ Regulatory approval for engineered controls should be obtainable. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented. ■ Approval from Montana Department of Transportation (MDT) would be needed before covering contaminated soil within the Highway 37 embankments, and coordination with MDT would be needed during implementation. ■ Approval from Montana Department of Transportation (MDT) would be needed before transporting contaminated soil across Highway 37, and coordination with MDT would be needed during implementation.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ Regulatory and facility approvals for offsite disposal at the Former Libby Vermiculite Mine are already obtained. ■ Use of offsite borrow source(s) outside of the Libby valley for cover/backfill materials would require coordination and approval.

Table F-27. Implementability Evaluation Summary – Alternative 3b (continued)

<table>
<tr><th colspan="2">Evaluation Factors for Implementability</th><th>Evaluation Summary</th></tr>
<tr><td rowspan="4">Availability of Services and Materials</td><td>Availability of adequate offsite treatment, storage capacity, and disposal capacity and services</td><td>■ The Former Libby Vermiculite Mine has sufficient capacity to accept all of the contaminated soil removed from the site.</td></tr>
<tr><td>Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources</td><td rowspan="3">■ The property for implementing the remedial action has already been obtained.
■ Labor, equipment and material for cover construction, removal of contaminated soil, offsite disposal or contaminated soil, and clean soil backfilling are available.
■ Suitable cover construction and backfill materials would be required from offsite source(s) outside of the Libby valley but are available.
■ Total volume to be excavated and transported offsite for disposal is approximately 430 cubic yards.
■ Total volume of suitable cover/backfill material required is approximately 750 cubic yards; approximately 27 truck loads would be required to haul in the suitable material.
■ Approximately 42 truck loads would be required to haul both the entire excavated volume of contaminated soil and suitable cover/backfill material.
■ Materials, equipment, and labor resources used for institutional/engineered controls and monitoring are easily obtainable.
■ Technical specialists and equipment are available for implementation of the remedy.</td></tr>
<tr><td>Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies</td></tr>
<tr><td>Availability of prospective technologies</td></tr>
</table>

Table F-28. Cost Evaluation Summary – Alternative 3b

Evaluation Factors for Cost	Approx. Cost (Dollars)
Total Capital Cost	$338,000
Total Annual O&M Cost	$696,000
Total Periodic Cost	$288,000
Total Cost (Excluding Present Value Discounting)	$1,322,000
Total Present Value Cost	$695,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30).
Costs are rounded to the nearest $1,000.

Appendix G

Detailed Alternative Analysis Cost Information

The cost spreadsheets included in this appendix were developed in accordance with EPA 540-R-00-002 (OSWER 9355.0-75) July 2000.

These costs should be used to compare alternative relative costs. Costs for project management, remedial design, and construction management were determined as percentages of capital cost per the guidance. Costs for these work items may not reflect costs for implementation. These costs are determined based on specific client requirements during implementation.

Present Value and Cost Estimate Summary

Alternative 1
No Action

TABLE PV-1

PRESENT VALUE ANALYSIS

Alternative **1**
No Action

Site:	**OU2 - Former Screening Plant**
Location:	**Libby, Montana**
Phase:	**Final Feasibility Study**
Base Year:	**2009**

Year[1]	Capital Costs[2]	Annual O&M Costs	Periodic Costs (Five Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	1.0000	$0
1	$0	$0	$0	$0	0.9346	$0
2	$0	$0	$0	$0	0.8734	$0
3	$0	$0	$0	$0	0.8163	$0
4	$0	$0	$0	$0	0.7629	$0
5	$0	$0	$48,000	$48,000	0.7130	$34,224
6	$0	$0	$0	$0	0.6663	$0
7	$0	$0	$0	$0	0.6227	$0
8	$0	$0	$0	$0	0.5820	$0
9	$0	$0	$0	$0	0.5439	$0
10	$0	$0	$48,000	$48,000	0.5083	$24,398
11	$0	$0	$0	$0	0.4751	$0
12	$0	$0	$0	$0	0.4440	$0
13	$0	$0	$0	$0	0.4150	$0
14	$0	$0	$0	$0	0.3878	$0
15	$0	$0	$48,000	$48,000	0.3624	$17,395
16	$0	$0	$0	$0	0.3387	$0
17	$0	$0	$0	$0	0.3166	$0
18	$0	$0	$0	$0	0.2959	$0
19	$0	$0	$0	$0	0.2765	$0
20	$0	$0	$48,000	$48,000	0.2584	$12,403
21	$0	$0	$0	$0	0.2415	$0
22	$0	$0	$0	$0	0.2257	$0
23	$0	$0	$0	$0	0.2109	$0
24	$0	$0	$0	$0	0.1971	$0
25	$0	$0	$48,000	$48,000	0.1842	$8,842
26	$0	$0	$0	$0	0.1722	$0
27	$0	$0	$0	$0	0.1609	$0
28	$0	$0	$0	$0	0.1504	$0
29	$0	$0	$0	$0	0.1406	$0
30	$0	$0	$48,000	$48,000	0.1314	$6,307
TOTALS:	$0	$0	$288,000	**$288,000**		$103,569
TOTAL PRESENT VALUE OF ALTERNATIVE 1 [5]						**$104,000**

Notes:
[1] Duration is assumed to be 30 years for present value analysis.
[2] Costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-1.
[3] Total annual expenditure is the total cost per year with no discounting.
[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.
[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-1

Alternative **1**
No Action

COST ESTIMATE SUMMARY

Site:	OU2 - Former Screening Plant
Location:	Libby, Montana
Phase:	Final Feasibility Study
Base Year:	2009
Date:	August 21, 2009

Description: Alternative 1 (No Action) is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as a baseline for comparison against other remedial alternatives. This alternative would discontinue all current remedial activities and no further action would be initiated at the site to address the contaminated soil or otherwise mitigate the associated risks to human health or the environment. Five-year site reviews would be performed as required by the NCP to evaluate whether adequate protection of human health and the environment is provided. Site inspection would be performed as necessary to complete the 5-year site reviews. The No Action alternative provides an environmental baseline against which impacts of the various remedial alternatives can be compared.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW1-1	1	LS	$25,451	$25,451	Includes site inspection and 5-year review report.
Community Awareness Activities	CW1-2	1	LS	$6,263	$6,263	
SUBTOTAL					$31,714	
Contingency (Scope and Bid)		20%			$6,343	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$38,057	
Project Management		10%			$3,806	The high end of the recommended range in EPA 540-R-00-002 was used.
Technical Support		15%			$5,709	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$47,572	
TOTAL PERIODIC COST					**$48,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:

EA	Each
QTY	Quantity
LS	Lump Sum

Present Value and Cost Estimate Summary

Alternative 2
Institutional and Engineered Controls with Monitoring

TABLE PV-2

PRESENT VALUE ANALYSIS

Alternative 2

Institutional and Engineered Controls with Monitoring

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Year[1]	Capital Costs (Institutional and Engineered Controls)[2]	Capital Costs (Construction)[2]	Annual O&M Costs (Cover and Fence Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$190,000	$71,000	$0	$0	$261,000	0.9346	$243,931
2	$0	$0	$24,000	$0	$24,000	0.8734	$20,962
3	$0	$0	$24,000	$0	$24,000	0.8163	$19,591
4	$0	$0	$24,000	$0	$24,000	0.7629	$18,310
5	$0	$0	$24,000	$48,000	$72,000	0.7130	$51,336
6	$0	$0	$24,000	$0	$24,000	0.6663	$15,991
7	$0	$0	$24,000	$0	$24,000	0.6227	$14,945
8	$0	$0	$24,000	$0	$24,000	0.5820	$13,968
9	$0	$0	$24,000	$0	$24,000	0.5439	$13,054
10	$0	$0	$24,000	$48,000	$72,000	0.5083	$36,598
11	$0	$0	$24,000	$0	$24,000	0.4751	$11,402
12	$0	$0	$24,000	$0	$24,000	0.4440	$10,656
13	$0	$0	$24,000	$0	$24,000	0.4150	$9,960
14	$0	$0	$24,000	$0	$24,000	0.3878	$9,307
15	$0	$0	$24,000	$48,000	$72,000	0.3624	$26,093
16	$0	$0	$24,000	$0	$24,000	0.3387	$8,129
17	$0	$0	$24,000	$0	$24,000	0.3166	$7,598
18	$0	$0	$24,000	$0	$24,000	0.2959	$7,102
19	$0	$0	$24,000	$0	$24,000	0.2765	$6,636
20	$0	$0	$24,000	$48,000	$72,000	0.2584	$18,605
21	$0	$0	$24,000	$0	$24,000	0.2415	$5,796
22	$0	$0	$24,000	$0	$24,000	0.2257	$5,417
23	$0	$0	$24,000	$0	$24,000	0.2109	$5,062
24	$0	$0	$24,000	$0	$24,000	0.1971	$4,730
25	$0	$0	$24,000	$48,000	$72,000	0.1842	$13,262
26	$0	$0	$24,000	$0	$24,000	0.1722	$4,133
27	$0	$0	$24,000	$0	$24,000	0.1609	$3,862
28	$0	$0	$24,000	$0	$24,000	0.1504	$3,610
29	$0	$0	$24,000	$0	$24,000	0.1406	$3,374
30	$0	$0	$24,000	$48,000	$72,000	0.1314	$9,461
TOTALS:	$190,000	$71,000	$696,000	$288,000	$1,245,000		$622,881
TOTAL PRESENT VALUE OF ALTERNATIVE 2[5]							**$623,000**

Notes:

[1] Duration is assumed to be 30 years for present value analysis.
[2] Costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-2.
[3] Total annual expenditure is the total cost per year with no discounting.
[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.
[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.

Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-2

Alternative **2**

Institutional and Engineered Controls with Monitoring

COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 2 uses a remedial strategy that emphasizes engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the existing cover system (placed during the interim remedial actions) as well as existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW2-1A	1	LS	$31,886	$31,886	
Engineered Controls	CW2-1B	1	LS	$75,342	$75,342	
SUBTOTAL					$107,228	
Contingency (Scope and Bid)		20%			$21,446	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$128,674	
Project Management		8%			$10,294	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		15%			$19,301	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		10%			$12,867	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$19,301	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$190,437	
TOTAL CAPITAL COST					**$190,000**	Total capital cost is rounded to the nearest $1,000.

CONSTRUCTION CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Mobilization/Demobilization	CW2-4	1	EA	$3,831	$3,831	
Surveying for Construction Control	CW2-5	1	LS	$5,630	$5,630	
Equipment Decontamination	CW2-6	1	LS	$11,352	$11,352	
Site Maintenance and Control During Construction	CW2-7	1	YR	$16,153	$16,153	
SUBTOTAL					$36,966	
Contingency (Scope and Bid)		20%			$7,393	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$44,359	
Project Management		10%			$4,436	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		20%			$8,872	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$6,654	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$6,654	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$70,975	
TOTAL CAPITAL COST					**$71,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-2

Alternative **2**

Institutional and Engineered Controls with Monitoring

COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 2 uses a remedial strategy that emphasizes engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the existing cover system (placed during the interim remedial actions) as well as existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

COVER AND FENCE MAINTENANCE AND INSPECTION ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 2 through 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Fence and Soil Cover O&M	CW2-3A	1	LS	$12,662	$12,662	Includes labor for cover, and remedy maintenance
Annual Site Inspection	CW2-3B	1	LS	$1,486	$1,486	Includes annual site inspection
SUBTOTAL					$14,148	
Contingency (Scope and Bid)		20%			$2,830	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$16,978	
Project Management		10%			$1,698	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$2,547	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$2,547	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$23,770	
TOTAL ANNUAL O&M COST					**$24,000**	Total O&M cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEWS PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW2-2	1	LS	$25,451	$25,451	Includes site inspection and 5-year review report
Community Awareness Activities	CW2-8	1	LS	$6,263	$6,263	Includes public notification and meetings associated with 5-year site review
SUBTOTAL					$31,714	
Contingency (Scope and Bid)		20%			$6,343	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$38,057	
Project Management		10%			$3,806	The high end of the recommended range in EPA 540-R-00-002 was used.
Technical Support		15%			$5,709	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$47,572	
TOTAL PERIODIC COST					**$48,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:
EA Each
LS Lump Sum
QTY Quantity
YR Year

Present Value and Cost Estimate Summary

Alternative 3a

In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

TABLE PV-3a

PRESENT VALUE ANALYSIS

Alternative 3a

In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Year[1]	Capital Costs (Institutional and Engineered Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Cover and Fence Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$190,000	$133,000	$0	$0	$323,000	0.9346	$301,876
2	$0	$0	$24,000	$0	$24,000	0.8734	$20,962
3	$0	$0	$24,000	$0	$24,000	0.8163	$19,591
4	$0	$0	$24,000	$0	$24,000	0.7629	$18,310
5	$0	$0	$24,000	$48,000	$72,000	0.7130	$51,336
6	$0	$0	$24,000	$0	$24,000	0.6663	$15,991
7	$0	$0	$24,000	$0	$24,000	0.6227	$14,945
8	$0	$0	$24,000	$0	$24,000	0.5820	$13,968
9	$0	$0	$24,000	$0	$24,000	0.5439	$13,054
10	$0	$0	$24,000	$48,000	$72,000	0.5083	$36,598
11	$0	$0	$24,000	$0	$24,000	0.4751	$11,402
12	$0	$0	$24,000	$0	$24,000	0.4440	$10,656
13	$0	$0	$24,000	$0	$24,000	0.4150	$9,960
14	$0	$0	$24,000	$0	$24,000	0.3878	$9,307
15	$0	$0	$24,000	$48,000	$72,000	0.3624	$26,093
16	$0	$0	$24,000	$0	$24,000	0.3387	$8,129
17	$0	$0	$24,000	$0	$24,000	0.3166	$7,598
18	$0	$0	$24,000	$0	$24,000	0.2959	$7,102
19	$0	$0	$24,000	$0	$24,000	0.2765	$6,636
20	$0	$0	$24,000	$48,000	$72,000	0.2584	$18,605
21	$0	$0	$24,000	$0	$24,000	0.2415	$5,796
22	$0	$0	$24,000	$0	$24,000	0.2257	$5,417
23	$0	$0	$24,000	$0	$24,000	0.2109	$5,062
24	$0	$0	$24,000	$0	$24,000	0.1971	$4,730
25	$0	$0	$24,000	$48,000	$72,000	0.1842	$13,262
26	$0	$0	$24,000	$0	$24,000	0.1722	$4,133
27	$0	$0	$24,000	$0	$24,000	0.1609	$3,862
28	$0	$0	$24,000	$0	$24,000	0.1504	$3,610
29	$0	$0	$24,000	$0	$24,000	0.1406	$3,374
30	$0	$0	$24,000	$48,000	$72,000	0.1314	$9,461
TOTALS:	$190,000	$133,000	$696,000	$288,000	$1,307,000		$680,826
TOTAL PRESENT VALUE OF ALTERNATIVE 3a[5]							**$681,000**

Notes:
[1] Duration is assumed to be 30 years for present value analysis.
[2] Costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-3a.
[3] Total annual expenditure is the total cost per year with no discounting.
[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.
[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.
They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-3a

Alternative **3a**

In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 3a uses a remedial strategy that emphasizes in-place containment (covers), institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Covers over contaminated soil would be constructed within the west embankments of Highway 37 and the area surrounding sample 1-03000 located inside the Flyway Subarea. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the newly-constructed and existing cover systems (placed during the interim remedial actions) as well as existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW3a-1A	1	LS	$31,886	$31,886	
Engineered Controls	CW3a-1B	1	LS	$75,342	$75,342	
SUBTOTAL					$107,228	
Contingency (Scope and Bid)		20%			$21,446	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$128,674	
Project Management		8%			$10,294	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		15%			$19,301	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		10%			$12,867	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$19,301	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$190,437	
TOTAL CAPITAL COST					**$190,000**	Total capital cost is rounded to the nearest $1,000.

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Mobilization/Demobilization	CW3a-6	1	EA	$5,201	$5,201	
Borrow Material Sampling	CW3a-10	1	LS	$1,972	$1,972	
Construction of Soil Cover	CW3a-4	1	LS	$25,240	$25,240	
Hydroseeding of Soil Cover	CW3a-5	1	LS	$751	$751	
Surveying for Construction Control	CW3a-7	1	LS	$6,886	$6,886	
Equipment Decontamination	CW3a-8	1	LS	$11,352	$11,352	
Site Maintenance and Control During Construction	CW3a-9	1	YR	$17,986	$17,986	
SUBTOTAL					$69,388	
Contingency (Scope and Bid)		20%			$13,878	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$83,266	
Project Management		10%			$8,327	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		20%			$16,653	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$12,490	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$12,490	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$133,226	
TOTAL CAPITAL COST					**$133,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-3a

Alternative **3a**

In-Place Containment of Contaminated Soil within the Flyway Subarea, Institutional and Engineered Controls with Monitoring

COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 3a uses a remedial strategy that emphasizes in-place containment (covers), institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Covers over contaminated soil would be constructed within the west embankments of Highway 37 and the area surrounding sample 1-03000 located inside the Flyway Subarea. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the newly-constructed and existing cover systems (placed during the interim remedial actions) as well as existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

COVER AND FENCE MAINTENANCE AND INSPECTION ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 2 through 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Fence and Soil Cover O&M	CW3a-3A	1	LS	$12,737	$12,737	Includes labor for cover, and remedy maintenance
Annual Site Inspection	CW3a-3B	1	LS	$1,486	$1,486	Includes annual site inspection
SUBTOTAL					$14,223	
Contingency (Scope and Bid)		20%			$2,845	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$17,068	
Project Management		10%			$1,707	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$2,560	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$2,560	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$23,895	
TOTAL ANNUAL O&M COST					**$24,000**	Total O&M cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEWS PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW3a-2	1	LS	$25,451	$25,451	Includes site inspection and 5-year review report
Community Awareness Activities	CW3a-11	1	LS	$6,263	$6,263	Includes public notification and meetings associated with 5-year site review
SUBTOTAL					$31,714	
Contingency (Scope and Bid)		20%			$6,343	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$38,057	
Project Management		10%			$3,806	The high end of the recommended range in EPA 540-R-00-002 was used.
Technical Support		15%			$5,709	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$47,572	
TOTAL PERIODIC COST					**$48,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:
EA Each
LS Lump Sum
QTY Quantity
YR Year

Present Value and Cost Estimate Summary

Alternative 3b

In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

PRESENT VALUE ANALYSIS

Alternative 3b

In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Year[1]	Capital Costs (Institutional and Engineered Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Cover and Fence Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews and Monitoring)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$190,000	$148,000	$0	$0	$338,000	0.9346	$315,895
2	$0	$0	$24,000	$0	$24,000	0.8734	$20,962
3	$0	$0	$24,000	$0	$24,000	0.8163	$19,591
4	$0	$0	$24,000	$0	$24,000	0.7629	$18,310
5	$0	$0	$24,000	$48,000	$72,000	0.7130	$51,336
6	$0	$0	$24,000	$0	$24,000	0.6663	$15,991
7	$0	$0	$24,000	$0	$24,000	0.6227	$14,945
8	$0	$0	$24,000	$0	$24,000	0.5820	$13,968
9	$0	$0	$24,000	$0	$24,000	0.5439	$13,054
10	$0	$0	$24,000	$48,000	$72,000	0.5083	$36,598
11	$0	$0	$24,000	$0	$24,000	0.4751	$11,402
12	$0	$0	$24,000	$0	$24,000	0.4440	$10,656
13	$0	$0	$24,000	$0	$24,000	0.4150	$9,960
14	$0	$0	$24,000	$0	$24,000	0.3878	$9,307
15	$0	$0	$24,000	$48,000	$72,000	0.3624	$26,093
16	$0	$0	$24,000	$0	$24,000	0.3387	$8,129
17	$0	$0	$24,000	$0	$24,000	0.3166	$7,598
18	$0	$0	$24,000	$0	$24,000	0.2959	$7,102
19	$0	$0	$24,000	$0	$24,000	0.2765	$6,636
20	$0	$0	$24,000	$48,000	$72,000	0.2584	$18,605
21	$0	$0	$24,000	$0	$24,000	0.2415	$5,796
22	$0	$0	$24,000	$0	$24,000	0.2257	$5,417
23	$0	$0	$24,000	$0	$24,000	0.2109	$5,062
24	$0	$0	$24,000	$0	$24,000	0.1971	$4,730
25	$0	$0	$24,000	$48,000	$72,000	0.1842	$13,262
26	$0	$0	$24,000	$0	$24,000	0.1722	$4,133
27	$0	$0	$24,000	$0	$24,000	0.1609	$3,862
28	$0	$0	$24,000	$0	$24,000	0.1504	$3,610
29	$0	$0	$24,000	$0	$24,000	0.1406	$3,374
30	$0	$0	$24,000	$48,000	$72,000	0.1314	$9,461
TOTALS:	$190,000	$148,000	$696,000	$288,000	$1,322,000		$694,845
TOTAL PRESENT VALUE OF ALTERNATIVE 3b[5]							**$695,000**

Notes:
[1] Duration is assumed to be 30 years for present value analysis.
[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-3b.
[3] Total annual expenditure is the total cost per year with no discounting.
[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.
[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented.
They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site:	**OU2 - Former Screening Plant**
Location:	**Libby, Montana**
Phase:	**Final Feasibility Study**
Base Year:	**2009**

Discount Rate (Percent): **7.0**

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130		
6	0.6663		
7	0.6227		
8	0.5820		
9	0.5439		
10	0.5083		
11	0.4751		
12	0.4440		
13	0.4150		
14	0.3878		
15	0.3624		
16	0.3387		
17	0.3166		
18	0.2959		
19	0.2765		
20	0.2584		
21	0.2415		
22	0.2257		
23	0.2109		
24	0.1971		
25	0.1842		

Notes:

1 Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

2 The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-3b

Alternative 3b

In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 3b uses a remedial strategy that emphasizes in-place containment (covers), removal and offsite disposal of contaminated soil, institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Covers over contaminated soil would be constructed within the west embankments of Highway 37, and removal along with offsite disposal of contaminated soil would be conducted within area surrounding sample 1-03000. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the newly-constructed and existing cover systems (placed during the interim remedial actions) as well as newly-backfilled areas and existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW3b-1A	1	LS	$31,886	$31,886	
Engineered Controls	CW3b-1B	1	LS	$75,342	$75,342	
SUBTOTAL					$107,228	
Contingency (Scope and Bid)		20%			$21,446	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$128,674	
Project Management		8%			$10,294	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		15%			$19,301	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		10%			$12,867	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$19,301	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$190,437	
TOTAL CAPITAL COST					**$190,000**	Total capital cost is rounded to the nearest $1,000.

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Mobilization/Demobilization	CW3b-6	1	EA	$5,201	$5,201	
Borrow Material Sampling	CW3b-10	1	LS	$1,972	$1,972	
Construction of Soil Cover	CW3b-4A	1	LS	$8,438	$8,438	
Contaminated Soil Removal and Disposal	CW3b-4B	1	LS	$10,592	$10,592	
Backfilling of Excavated Area	CW3b-4C	1	LS	$13,667	$13,667	
Hydroseeding of Soil Cover and Excavation Backfill Area	CW3b-5	1	LS	$751	$751	
Surveying for Construction Control	CW3b-7	1	LS	$6,886	$6,886	
Equipment Decontamination	CW3b-8	1	LS	$11,352	$11,352	
Site Maintenance and Control During Construction	CW3b-9	1	YR	$17,986	$17,986	
SUBTOTAL					$76,845	
Contingency (Scope and Bid)		20%			$15,369	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$92,214	
Project Management		10%			$9,221	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Remedial Design		20%			$18,443	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$13,832	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$13,832	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$147,542	
TOTAL CAPITAL COST					**$148,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-3b

Alternative **3b**

In-Place Containment and Removal of Contaminated Soil within the Flyway Subarea, Offsite Disposal at the Former Libby Vermiculite Mine, Institutional and Engineered Controls with Monitoring

COST ESTIMATE SUMMARY

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009
Date: August 31, 2009

Description: Alternative 3b uses a remedial strategy that emphasizes in-place containment (covers), removal and offsite disposal of contaminated soil, institutional controls, and engineered controls (fencing and signs) within the OU2 site to achieve protectiveness of human health and the environment. Covers over contaminated soil would be constructed within the west embankments of Highway 37, and removal along with offsite disposal of contaminated soil would be conducted within area surrounding sample 1-03000. Engineered controls would be constructed to exclude access and unacceptable uses of the Flyway Subarea, as soil contamination exists near sample location 1-03000, and the presence or absence of soil contamination in seasonally flooded areas within the Flyway Subarea is unknown. Institutional Controls would be implemented to the entire OU2 site, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the newly-constructed and existing cover systems (placed during the interim remedial actions) as well as newly-backfilled areas and existing and newly-constructed engineered controls. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary to ensure protectiveness of the remedy.

COVER AND FENCE MAINTENANCE AND INSPECTION ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS (Years 2 through 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Fence and Soil Cover O&M	CW3b-3A	1	LS	$12,737	$12,737	Includes labor for cover, and remedy maintenance
Annual Site Inspection	CW3b-3B	1	LS	$1,486	$1,486	Includes annual site inspection
SUBTOTAL					$14,223	
Contingency (Scope and Bid)		20%			$2,845	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$17,068	
Project Management		10%			$1,707	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Construction Management		15%			$2,560	Percentage from Exhibit 5-8 in EPA 540-R-00-002 was used.
Technical Support		15%			$2,560	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$23,895	
TOTAL ANNUAL O&M COST					**$24,000**	Total O&M cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW3b-2	1	LS	$25,451	$25,451	Includes site inspection and 5-year review report
Community Awareness Activities	CW3b-11	1	LS	$6,263	$6,263	Includes public notification and meetings associated with 5-year site review
SUBTOTAL					$31,714	
Contingency (Scope and Bid)		20%			$6,343	10% Scope, 10% Bid (Low end of recommended range in EPA 540-R-00-002).
SUBTOTAL					$38,057	
Project Management		10%			$3,806	The high end of the recommended range in EPA 540-R-00-002 was used.
Technical Support		15%			$5,709	Middle value of the recommended range in EPA 540-R-00-002 was used.
TOTAL					$47,572	
TOTAL PERIODIC COST					**$48,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 540-R-00-002 (July 2000).
Costs presented for this alternative are expected to have an accuracy between -30% to +50% of actual costs, based on the scope presented. They are prepared solely to facilitate relative comparisons between alternatives for FS evaluation purposes.

Abbreviations:
EA Each
LS Lump Sum
QTY Quantity
YR Year

Cost Worksheets

Alternative 1

TABLE CW1-1

Alternative 1 **Cost Worksheet: CW1-1**
Capital Cost Sub-Element
5-Year Site Reviews

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the 5-year site visits and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6C	Site Inspection - 1 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$413.09	$413.09	$413.09	8%	9%	$486	MII MII Assemblies	
M57	Per Diem for 1 Person	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$109.00	$109.00	$109.00	0%	0%	$109	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$49.87	$49.87	$0.00	$0.00	$0.00	$0.00	$49.87	$1,994.80	100%	9%	$4,349	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	80	HR	1.00	$31.87	$31.87	$0.00	$0.00	$0.00	$0.00	$31.87	$2,549.60	100%	9%	$5,558	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	120	HR	1.00	$30.43	$30.43	$0.00	$0.00	$0.00	$0.00	$30.43	$3,651.60	100%	9%	$7,960	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	16	HR	1.00	$35.79	$35.79	$0.00	$0.00	$0.00	$0.00	$35.79	$572.64	100%	9%	$1,248	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$25.80	$25.80	$0.00	$0.00	$0.00	$0.00	$25.80	$1,032.00	100%	9%	$2,250	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$22.83	$22.83	$0.00	$0.00	$0.00	$0.00	$22.83	$913.20	100%	9%	$1,991	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$25,451		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW1-2

Alternative 1
Capital Cost Sub-Element
Community Awareness Activities

Cost Worksheet: **CW1-2**

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:

This sub-element involves setting up a community meeting to inform the local community about the status of Former Screening Plant site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes costs for renting a meeting hall, court reporter, and publishing and sending notices or informational flyers.

Cost Analysis:

Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION		COMMENTS
L12	General Superintendent (P.M.)	16	HR	1.00	$59.86	$59.86	$0.00	$0.00	$0.00	$0.00	$59.86	$957.76	100%	9%	$2,088	SE	SalaryExpert.com	8 hrs per day, 2 days
L13	Project Manager	16	HR	1.00	$49.87	$49.87	$0.00	$0.00	$0.00	$0.00	$49.87	$797.92	100%	9%	$1,739	SE	SalaryExpert.com	8 hrs per day, 2 days
M56	Per Diem for 2 Person	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$218.00	$218.00	$436.00	0%	0%	$436	GSA	www.gsa.gov	
M65	Community Awareness Activities Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$2,000.00	$2,000.00	0%	0%	$2,000	A	Allowance	1 meeting per 5-yr review.
												TOTAL UNIT COST:			$6,263			

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote

For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Cost Worksheets

Alternative 2

TABLE CW2-1A

Alternative 2 **Cost Worksheet: CW2-1A**
Capital Cost Sub-Element
Institutional Controls

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves implementation of institutional controls for the site. The following cost includes labor and materials to develop legal documents for institutional controls and cost for document submission and recording. The cost also includes site survey to establish the site boundaries for the legal documents.

Cost Analysis:
Cost for Institutional Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L6	Environmental Lawyer	40	HR	1.00	$34.78	$34.78	$0.00	$0.00	$0.00	$0.00	$34.78	$1,391.20	100%	9%	$3,033	SE SalaryExpert.com	
L15	Paralegal	120	HR	1.00	$21.42	$21.42	$0.00	$0.00	$0.00	$0.00	$21.42	$2,570.40	100%	9%	$5,603	SE SalaryExpert.com	
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$22.83	$22.83	$0.00	$0.00	$0.00	$0.00	$22.83	$913.20	100%	9%	$1,991	SE SalaryExpert.com	
M11A	Document Submission and Recording Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
A38A	Site Survey - Clean Area	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$534.80	$534.80	$1,069.60	8%	9%	$1,259	MII MII Assemblies	To establish site boundary description for legal documents
M12	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	0%	0%	$15,000	A Allowance	
												TOTAL UNIT COST:			$31,886		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE. MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW2-1B

Alternative 3 **Cost Worksheet: CW2-1B**
Capital Cost Sub-Element
Engineered Controls

COST WORKSHEET

Site: OU2 - Former Screening Plant **Prepared By:** AS **Date:** 8/19/2009
Location: Libby, Montana
Phase: Final Feasibility Study **Checked By:** GH **Date:** 8/20/2009
Base Year: 2009

Work Statement:
This sub-element involves installation of engineered control (fencing and warning signs) for the seasonally flooded areas within the Flyway Subarea. The following cost includes includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Engineered Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A31B	Fence Installation - Clean Area	3,330	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.81	$5.81	$19,347.30	8%	9%	$22,776	MII MII Assemblies	
A31C	Signage Installation - Clean Area	3	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.29	$148.29	$444.87	8%	9%	$524	MII MII Assemblies	
M5	Chainlink Fence with Fittings & Accessories	3,330	LF	1.00	$0.00	$0.00	$0.00	$0.00	$13.02	$0.00	$13.02	$43,356.60	8%	9%	$51,039	V Vendor Quote	8' high fence. Includes all fittings and accessories along with 2 x 12' swing gates
M9	Asbestos Warning Signs	11	EA	1.00	$0.00	$0.00	$0.00	$0.00	$77.46	$0.00	$77.46	$852.06	8%	9%	$1,003	V Vendor Quote	Warning signs 20" x 14" with posts
												TOTAL UNIT COST:			$75,342		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW2-2

Alternative 2 **Cost Worksheet: CW2-2**
Capital Cost Sub-Element
5-Year Site Reviews

COST WORKSHEET

Site: OU2 - Former Screening Plant **Prepared By:** AS **Date:** 8/19/2009
Location: Libby, Montana
Phase: Final Feasibility Study **Checked By:** GH **Date:** 8/20/2009
Base Year: 2009

Work Statement:
This sub-element involves the site visit and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6C	Site Inspection - 1 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$413.09	$413.09	$413.09	8%	9%	$486	MII MII Assemblies	
M57	Per Diem for 1 Person	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$109.00	$109.00	$109.00	0%	0%	$109	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$49.87	$49.87	$0.00	$0.00	$0.00	$0.00	$49.87	$1,994.80	100%	9%	$4,349	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	80	HR	1.00	$31.87	$31.87	$0.00	$0.00	$0.00	$0.00	$31.87	$2,549.60	100%	9%	$5,558	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	120	HR	1.00	$30.43	$30.43	$0.00	$0.00	$0.00	$0.00	$30.43	$3,651.60	100%	9%	$7,960	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	16	HR	1.00	$35.79	$35.79	$0.00	$0.00	$0.00	$0.00	$35.79	$572.64	100%	9%	$1,248	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$25.80	$25.80	$0.00	$0.00	$0.00	$0.00	$25.80	$1,032.00	100%	9%	$2,250	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$22.83	$22.83	$0.00	$0.00	$0.00	$0.00	$22.83	$913.20	100%	9%	$1,991	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$25,451		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW2-3A

Alternative 2 **Cost Worksheet:** **CW2-3A**
Capital Cost Sub-Element
Fence and Soil Cover O&M

COST WORKSHEET

Site: OU2 - Former Screening Plant **Prepared By:** AS **Date:** 8/19/2009
Location: Libby, Montana
Phase: Final Feasibility Study **Checked By:** GH **Date:** 8/20/2009
Base Year: 2009

Work Statement:
This sub-element involves O&M of engineered controls (fence and signs) installed at the Flyway Subarea. It also includes O&M of covers and engineered controls placed during the interim remedial actions. The following cost includes costs for on-site labor, and O&M allowances for site maintenance.

Cost Analysis:
Cost for Fence and Soil Cover O&M (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$692.47	$692.47	$8,309.64	8%	9%	$9,782	MII MII Assemblies	1 day/month
M49	O&M Allowance	19.20	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.00	$150.00	$2,880.00	0%	0%	$2,880	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$12,662		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW2-3B

Alternative 2 **Cost Worksheet: CW2-3B**
Capital Cost Sub-Element
Annual Site Inspection

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the annual site inspection to inspect the integrity of the all the components of the remedy put in place. It includes costs for on-site labor, equipment, materials.

Cost Analysis:
Cost for Annual Site Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6C	Site Inspection - 1 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$413.09	$413.09	$413.09	8%	9%	$486	MII MII Assemblies	1 day/year
M11	Site Inspection Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,000.00	$1,000.00	$1,000.00	0%	0%	$1,000	A Allowance	
												TOTAL UNIT COST:			$1,486		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW2-4

Alternative 2 **Cost Worksheet: CW2-4**
Capital Cost Sub-Element
Mobilization/Demobilization

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves mobilization and demobilization of all the required equipment to and from the site respectively to install engineered controls.

Cost Analysis:
Cost for Mobilization/Demobilization (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A37C	Mobilization and Demobilization - Small Equipment	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$274.46	$274.46	$548.92	8%	9%	$646	MII MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,352.95	$1,352.95	$2,705.90	8%	9%	$3,185	MII MII Assemblies	
												TOTAL UNIT COST:			$3,831		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW2-5

Alternative 2
Capital Cost Sub-Element
Surveying for Construction Control

Cost Worksheet: CW2-5

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves cost for site surveying before and after the remedial alternative is implemented.

Cost Analysis:
Cost for Surveying for Construction Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A38A	Site Survey - Clean Area	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$534.80	$534.80	$534.80	8%	9%	$630	MII MII Assemblies	
M12A	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
												TOTAL UNIT COST:			$5,630		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW2-6

Alternative 2 **Cost Worksheet: CW2-6**
Capital Cost Sub-Element
Equipment Decontamination

COST WORKSHEET

Site: OU2 - Former Screening Plant **Prepared By:** AS **Date:** 8/19/2009
Location: Libby, Montana
Phase: Final Feasibility Study **Checked By:** GH **Date:** 8/20/2009
Base Year: 2009

Work Statement:
This sub-element involves decontamination of equipment used onsite. Water for decon/washing will be used from either the onsite pumphouse or the Kootenai River with no cost for the water.

Cost Analysis:
Cost for Equipment Decontamination (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Equipment Decon/Washing																
A3A	Equipment Decon/Washing	17	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$141.90	$141.90	$2,412.30	8%	9%	$2,840	MII MII Assemblies	
M46	Poly Tank, 5,300 Gal	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$7,231.06	$0.00	$7,231.06	$7,231.06	8%	9%	$8,512	V Vendor Quote	Includes purchase and delivery to the Site.
												TOTAL UNIT COST:			$11,352		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW2-7

Alternative 2 **Cost Worksheet:** **CW2-7**
Capital Cost Sub-Element
Site Maintenance and Control During Construction

COST WORKSHEET

Site: OU2 - Former Screening Plant **Prepared By:** AS **Date:** 8/19/2009
Location: Libby, Montana
Phase: Final Feasibility Study **Checked By:** GH **Date:** 8/20/2009
Base Year: 2009

Work Statement:
This sub-element involves site maintenance during construction. The annual costs for site maintenance during construction include labor, material, and equipment.

Cost Analysis:
Cost for Site Maintenance and Control During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Dust Control																
A1A	Dust Control/Washing	17	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$680.36	$680.36	$11,566.12	8%	9%	$13,616	MII MII Assemblies	Includes onsite dust control and pavement washing
	Equipment Fueling																
A2A	Equipment Fueling	17	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$126.76	$126.76	$2,154.92	8%	9%	$2,537	MII MII Assemblies	
												TOTAL UNIT COST:			$16,153		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW2-8

Alternative 2
Capital Cost Sub-Element
Community Awareness Activities

Cost Worksheet: **CW2-8**

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of Former Screening Plant site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes costs for renting a meeting hall, court reporter, and publishing and sending notices or informational flyers.

Cost Analysis:
Cost for Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	16	HR	1.00	$59.86	$59.86	$0.00	$0.00	$0.00	$0.00	$59.86	$957.76	100%	9%	$2,088	SE SalaryExpert.com	8 hrs per day
L13	Project Manager	16	HR	1.00	$49.87	$49.87	$0.00	$0.00	$0.00	$0.00	$49.87	$797.92	100%	9%	$1,739	SE SalaryExpert.com	8 hrs per day
M56	Per Diem for 2 Person	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$218.00	$218.00	$436.00	0%	0%	$436	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$2,000.00	$2,000.00	0%	0%	$2,000	A Allowance	1 meeting per 5-yr review.
												TOTAL UNIT COST:			$6,263		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Cost Worksheets

Alternative 3a

TABLE CW3a-1A

Alternative 3a **Cost Worksheet:** **CW3a-1A**
Capital Cost Sub-Element
Institutional Controls

COST WORKSHEET

Site: OU2 - Former Screening Plant **Prepared By:** AS **Date:** 8/19/2009
Location: Libby, Montana
Phase: Final Feasibility Study **Checked By:** GH **Date:** 8/20/2009
Base Year: 2009

Work Statement:
This sub-element involves implementation of institutional controls for the site. The following cost includes labor and materials to develop legal documents for institutional controls and cost for document submission and recording. The cost also includes site survey to establish the site boundaries for the legal documents.

Cost Analysis:
Cost for Institutional Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L6	Environmental Lawyer	40	HR	1.00	$34.78	$34.78	$0.00	$0.00	$0.00	$0.00	$34.78	$1,391.20	100%	9%	$3,033	SE SalaryExpert.com	
L15	Paralegal	120	HR	1.00	$21.42	$21.42	$0.00	$0.00	$0.00	$0.00	$21.42	$2,570.40	100%	9%	$5,603	SE SalaryExpert.com	
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$22.83	$22.83	$0.00	$0.00	$0.00	$0.00	$22.83	$913.20	100%	9%	$1,991	SE SalaryExpert.com	
M11A	Document Submission and Recording Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
A38A	Site Survey - Clean Area	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$534.80	$534.80	$1,069.60	8%	9%	$1,259	MII MII Assemblies	To establish site boundary as needed
M12	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	0%	0%	$15,000	A Allowance	
												TOTAL UNIT COST:			$31,886		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE. MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3a-1B

Alternative 3a
Capital Cost Sub-Element
Engineered Controls

Cost Worksheet: CW3a-1B

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves installation of engineered controls (fencing and warning signs) for the seasonally flooded areas within the Flyway Subarea. The following cost includes includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Engineered Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A31B	Fence Installation - Clean Area	3,330	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.81	$5.81	$19,347.30	8%	9%	$22,776	MII MII Assemblies	
A31C	Signage Installation - Clean Area	3	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.29	$148.29	$444.87	8%	9%	$524	MII MII Assemblies	
M5	Chainlink Fence with Fittings & Accessories	3,330	LF	1.00	$0.00	$0.00	$0.00	$0.00	$13.02	$0.00	$13.02	$43,356.60	8%	9%	$51,039	V Vendor Quote	8' high fence. Includes all fittings and accessories along with 2 x 12' swing gates
M9	Asbestos Warning Signs	11	EA	1.00	$0.00	$0.00	$0.00	$0.00	$77.46	$0.00	$77.46	$852.06	8%	9%	$1,003	V Vendor Quote	Warning signs 20" x 14" with posts
													TOTAL UNIT COST:		$75,342		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3a-2

Alternative 3a **Cost Worksheet:** **CW3a-2**
Capital Cost Sub-Element
5-Year Site Reviews

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the site visit and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6C	Site Inspection - 1 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$413.09	$413.09	$413.09	8%	9%	$486	MII MII Assemblies	
M57	Per Diem for 1 Person	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$109.00	$109.00	$109.00	0%	0%	$109	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$49.87	$49.87	$0.00	$0.00	$0.00	$0.00	$49.87	$1,994.80	100%	9%	$4,349	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	80	HR	1.00	$31.87	$31.87	$0.00	$0.00	$0.00	$0.00	$31.87	$2,549.60	100%	9%	$5,558	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	120	HR	1.00	$30.43	$30.43	$0.00	$0.00	$0.00	$0.00	$30.43	$3,651.60	100%	9%	$7,960	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	16	HR	1.00	$35.79	$35.79	$0.00	$0.00	$0.00	$0.00	$35.79	$572.64	100%	9%	$1,248	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$25.80	$25.80	$0.00	$0.00	$0.00	$0.00	$25.80	$1,032.00	100%	9%	$2,250	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$22.83	$22.83	$0.00	$0.00	$0.00	$0.00	$22.83	$913.20	100%	9%	$1,991	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$25,451		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3a-3A

Alternative 3a **Cost Worksheet: CW3a-3A**
Capital Cost Sub-Element
Fence and Soil Cover O&M

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves O&M of covers and engineered controls (fence and signs) installed at the Flyway Subarea. It also includes O&M of covers and engineered controls placed during the interim remedial actions. The following cost includes costs for on-site labor, and O&M allowances for site maintenance.

Cost Analysis:
Cost for Fence and Soil Cover O&M (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$692.47	$692.47	$8,309.64	8%	9%	$9,782	MII MII Assemblies	1 day/month
M49	O&M Allowance	19.70	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.00	$150.00	$2,955.00	0%	0%	$2,955	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$12,737		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3a-3B

Alternative 3a **Cost Worksheet:** **CW3a-3B**
Capital Cost Sub-Element
Annual Site Inspection

COST WORKSHEET

Site: OU2 - Former Screening Plant **Prepared By:** AS **Date:** 8/19/2009
Location: Libby, Montana
Phase: Final Feasibility Study **Checked By:** GH **Date:** 8/20/2009
Base Year: 2009

Work Statement:
This sub-element involves the annual site inspection to inspect the integrity of the all the components of the remedy put in place. It includes costs for on-site labor, equipment, materials.

Cost Analysis:
Cost for Annual Site Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6C	Site Inspection - 1 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$413.09	$413.09	$413.09	8%	9%	$486	MII MII Assemblies	1 day/year
M11	Site Inspection Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,000.00	$1,000.00	$1,000.00	0%	0%	$1,000	A Allowance	
												TOTAL UNIT COST:			$1,486		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3a-4

Alternative 3a | **Cost Worksheet:** **CW3a-4**
Capital Cost Sub-Element
Construction of Soil Cover

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the construction of a soil cover over contaminated areas. The orange construction fence is a visible marker layer to be placed below the cover. This sub-element includes cost for labor, equipment and material (soil from offsite borrow area).

Cost Analysis:
Cost for Construction of Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Subsoil Placement Over Contaminated Soil																
A11A	Clean Fill Spreading/Grading	640	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.51	$2.51	$1,606.40	8%	9%	$1,891	MII MII Assemblies	
A22A	Clean Fill Compaction - Small Area	640	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.09	$2.09	$1,337.60	8%	9%	$1,575	MII MII Assemblies	
M39A	Orange Fence	15,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.00	$0.08	$1,200.00	8%	9%	$1,413	V Vendor Quote	Includes purchase and delivery to the Site.
	Topsoil Placement for Cover																
A11A	Clean Fill Spreading/Grading	320	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.51	$2.51	$803.20	8%	9%	$946	MII MII Assemblies	
A22A	Clean Fill Compaction - Small Area	320	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.09	$2.09	$668.80	8%	9%	$787	MII MII Assemblies	Assume 10% of total fill
	Clean Fill (Subsoil) and Top Soil																
M45	Subsoil, Delivered	640	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$8.14	$0.00	$8.14	$5,209.60	8%	9%	$6,133	V Vendor Quote	Includes purchase and delivery to the Site.
M45A	Topsoil Amended, Delivered	320	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$33.17	$0.00	$33.17	$10,614.40	8%	9%	$12,495	V Vendor Quote	Includes purchase and delivery to the Site.
												TOTAL UNIT COST:			$25,240		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3a-5

Alternative 3a | **Cost Worksheet: CW3a-5**
Capital Cost Sub-Element
Hydroseeding of Soil Cover

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the revegetation of the soil cover with hydroseeding. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Hydroseeding of Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hydroseeding																
A30A	Hydro-Seeding Crew	0.50	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$77.25	$77.25	$38.63	8%	9%	$45	MII MII Assemblies	
M20	Seed, Hydromulch with Fertilizer	15,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.04	$0.00	$0.04	$600.00	8%	9%	$706	CW09 32 92 1914 3100	Includes material
												TOTAL UNIT COST:			$751		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3a-6

Alternative 3a **Cost Worksheet: CW3a-6**
Capital Cost Sub-Element
Mobilization/Demobilization

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves mobilization and demobilization of all the required equipment to and from the site respectively.

Cost Analysis:
Cost for Mobilization/Demobilization (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A37B	Mobilization and Demobilization - Medium-Sized Equipment	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$581.76	$581.76	$1,163.52	8%	9%	$1,370	MII MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$274.46	$274.46	$548.92	8%	9%	$646	MII MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,352.95	$1,352.95	$2,705.90	8%	9%	$3,185	MII MII Assemblies	
												TOTAL UNIT COST:			$5,201		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3a-7

Alternative 3a **Cost Worksheet:** **CW3a-7**
Capital Cost Sub-Element
Surveying for Construction Control

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves cost for site surveying before and after the remedial alternative is implemented.

Cost Analysis:
Cost for Surveying for Construction Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A38A	Site Survey - Clean Area	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$534.80	$534.80	$534.80	8%	9%	$630	MII MII Assemblies	
A38B	Site Survey - Contaminated Area	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,067.20	$1,067.20	$1,067.20	8%	9%	$1,256	MII MII Assemblies	
M12A	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
												TOTAL UNIT COST:			$6,886		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3a-8

Alternative 3a **Cost Worksheet: CW3a-8**
Capital Cost Sub-Element
Equipment Decontamination

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves decontamination of equipment used onsite. Water for decon/washing will be used from either the onsite pumphouse or the Kootenai River with no cost for the water.

Cost Analysis:
Cost for Equipment Decontamination (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Equipment Decon/Washing																
A3A	Equipment Decon/Washing	17	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$141.90	$141.90	$2,412.30	8%	9%	$2,840	MII MII Assemblies	
M46	Poly Tank, 5,300 Gal	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$7,231.06	$0.00	$7,231.06	$7,231.06	8%	9%	$8,512	V Vendor Quote	Includes purchase and delivery to the Site.
												TOTAL UNIT COST:			$11,352		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	**NOTES:** Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3a-9

Alternative 3a **Cost Worksheet:** **CW3a-9**
Capital Cost Sub-Element
Site Maintenance and Control During Construction

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves site maintenance during construction. The annual costs for site maintenance during construction include labor, material, and equipment.

Cost Analysis:
Cost for Site Maintenance and Control During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Dust Control																
A1A	Dust Control/Washing	17	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$680.36	$680.36	$11,566.12	8%	9%	$13,616	MII MII Assemblies	Includes onsite dust control and pavement washing
	Equipment Fueling																
A2A	Equipment Fueling	17	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$126.76	$126.76	$2,154.92	8%	9%	$2,537	MII MII Assemblies	
	Construction Safety and Traffic Control																
A33A	Barricade and Traffic Control Setup	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,017.01	$1,017.01	$1,017.01	8%	9%	$1,197	MII MII Assemblies	
M36	3" x 1,000' Yellow Caution Tape	1	RL	1.00	$0.00	$0.00	$0.00	$0.00	$16.47	$0.00	$16.47	$16.47	8%	9%	$19	V Vendor Quote	Includes purchase and delivery to the Site.
M37	3" x 1,000' Red Danger Asbestos Haz Tape	1	RL	1.00	$0.00	$0.00	$0.00	$0.00	$16.47	$0.00	$16.47	$16.47	8%	9%	$19	V Vendor Quote	Includes purchase and delivery to the Site.
M38	Reflecting Barricade with Light	4	EA	1.00	$0.00	$0.00	$0.00	$0.00	$79.80	$0.00	$79.80	$319.20	8%	9%	$376	V Vendor Quote	Includes purchase and delivery to the Site.
M39	Orange Safety Fence with Post	2	CLF	1.00	$0.00	$0.00	$0.00	$0.00	$94.29	$0.00	$94.29	$188.58	8%	9%	$222	V Vendor Quote	Includes purchase and delivery to the Site.
												TOTAL UNIT COST:			$17,986		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist: / **NOTES:**

FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3a-10

Alternative 3a **Cost Worksheet: CW3a-10**
Capital Cost Sub-Element
Borrow Material Sampling

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves determining whether asbestos fibers are present in the borrow source. The following includes the labor, material and equipment cost, and shipping cost required for the borrow material sampling.

Cost Analysis:
Cost for Borrow Material Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$866.39	$866.39	$866.39	8%	9%	$1,020	MII MII Assemblies	
M50	Soil Sample Analysis (PLM-VE)	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.75	$25.75	$25.75	8%	9%	$30	P Previous Work	
M50A	Soil Sample Analysis (Stereomicroscopy)	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.75	$25.75	$25.75	8%	9%	$30	P Previous Work	
M54D	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$500.00	$500.00	$500.00	8%	9%	$589	A Allowance	
M53D	Sampling/Other Supplies	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$257.50	$257.50	$257.50	8%	9%	$303	P Previous Work	
												TOTAL UNIT COST:			$1,972		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3a-11

Alternative 3a | **Cost Worksheet:** CW3a-11
Capital Cost Sub-Element
Community Awareness Activities

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of Former Screening Plant site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes costs for renting a meeting hall, court reporter, and publishing and sending notices or informational flyers.

Cost Analysis:
Cost for Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	16	HR	1.00	$59.86	$59.86	$0.00	$0.00	$0.00	$0.00	$59.86	$957.76	100%	9%	$2,088	SE SalaryExpert.com	8 hrs per day
L13	Project Manager	16	HR	1.00	$49.87	$49.87	$0.00	$0.00	$0.00	$0.00	$49.87	$797.92	100%	9%	$1,739	SE SalaryExpert.com	8 hrs per day
M56	Per Diem for 2 Person	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$218.00	$218.00	$436.00	0%	0%	$436	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$2,000.00	$2,000.00	0%	0%	$2,000	A Allowance	1 meeting per 5-yr review.
												TOTAL UNIT COST:			$6,263		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Cost Worksheets

Alternative 3b

TABLE CW3b-1A

Alternative 3b
Capital Cost Sub-Element
Institutional Controls

Cost Worksheet: CW3b-1A

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves implementation of institutional controls for the site. The following cost includes labor and materials to develop legal documents for institutional controls and cost for document submission and recording. The cost also includes site survey to establish the site boundaries for the legal documents.

Cost Analysis:
Cost for Institutional Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L6	Environmental Lawyer	40	HR	1.00	$34.78	$34.78	$0.00	$0.00	$0.00	$0.00	$34.78	$1,391.20	100%	9%	$3,033	SE SalaryExpert.com	
L15	Paralegal	120	HR	1.00	$21.42	$21.42	$0.00	$0.00	$0.00	$0.00	$21.42	$2,570.40	100%	9%	$5,603	SE SalaryExpert.com	
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$22.83	$22.83	$0.00	$0.00	$0.00	$0.00	$22.83	$913.20	100%	9%	$1,991	SE SalaryExpert.com	
M11A	Document Submission and Recording Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
A38A	Site Survey - Clean Area	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$534.80	$534.80	$1,069.60	8%	9%	$1,259	MII MII Assemblies	To establish site boundary as needed
M12	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	0%	0%	$15,000	A Allowance	
												TOTAL UNIT COST:			$31,886		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-1B

Alternative 3b **Cost Worksheet: CW3b-1B**
Capital Cost Sub-Element
Engineered Controls

COST WORKSHEET

Site: OU2 - Former Screening Plant **Prepared By:** AS **Date:** 8/19/2009
Location: Libby, Montana
Phase: Final Feasibility Study **Checked By:** GH **Date:** 8/20/2009
Base Year: 2009

Work Statement:
This sub-element involves installation of engineered controls (fencing and warning signs) for the seasonally flooded areas within the Flyway Subarea. The following cost includes includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Engineered Controls (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A31B	Fence Installation - Clean Area	3,330	LF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.81	$5.81	$19,347.30	8%	9%	$22,776	MII MII Assemblies	
A31C	Signage Installation - Clean Area	3	HR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$148.29	$148.29	$444.87	8%	9%	$524	MII MII Assemblies	
M5	Chainlink Fence with Fittings & Accessories	3,330	LF	1.00	$0.00	$0.00	$0.00	$0.00	$13.02	$0.00	$13.02	$43,356.60	8%	9%	$51,039	V Vendor Quote	8' high fence. Includes all fittings and accessories along with 2 x 12' swing gates
M9	Asbestos Warning Signs	11	EA	1.00	$0.00	$0.00	$0.00	$0.00	$77.46	$0.00	$77.46	$852.06	8%	9%	$1,003	V Vendor Quote	Warning signs 20" x 14" with posts
												TOTAL UNIT COST:			$75,342		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-2

Alternative 3b
Capital Cost Sub-Element
5-Year Site Reviews

Cost Worksheet: **CW3b-2**

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the site visit and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6C	Site Inspection - 1 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$413.09	$413.09	$413.09	8%	9%	$486	MII MII Assemblies	
M57	Per Diem for 1 Person	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$109.00	$109.00	$109.00	0%	0%	$109	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$49.87	$49.87	$0.00	$0.00	$0.00	$0.00	$49.87	$1,994.80	100%	9%	$4,349	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	80	HR	1.00	$31.87	$31.87	$0.00	$0.00	$0.00	$0.00	$31.87	$2,549.60	100%	9%	$5,558	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	120	HR	1.00	$30.43	$30.43	$0.00	$0.00	$0.00	$0.00	$30.43	$3,651.60	100%	9%	$7,960	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	16	HR	1.00	$35.79	$35.79	$0.00	$0.00	$0.00	$0.00	$35.79	$572.64	100%	9%	$1,248	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$25.80	$25.80	$0.00	$0.00	$0.00	$0.00	$25.80	$1,032.00	100%	9%	$2,250	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$22.83	$22.83	$0.00	$0.00	$0.00	$0.00	$22.83	$913.20	100%	9%	$1,991	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	0%	0%	$1,500	A Allowance	
												TOTAL UNIT COST:			$25,451		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3b-3A

Alternative 3b
Capital Cost Sub-Element
Fence and Soil Cover O&M

Cost Worksheet: CW3b-3A

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves O&M of covers, backfilled areas, and engineered controls (fence and signs) installed at the Flyway Subarea. It also includes O&M of covers and engineered controls placed during the interim remedial actions. The following cost includes costs for on-site labor, and O&M allowances for site maintenance.

Cost Analysis:
Cost for Fence and Soil Cover O&M (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$692.47	$692.47	$8,309.64	8%	9%	$9,782	MII MII Assemblies	1 day/month
M49	O&M Allowance	19.70	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$150.00	$150.00	$2,955.00	0%	0%	$2,955	A Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
												TOTAL UNIT COST:			$12,737		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-3B

Alternative 3b **Cost Worksheet:** **CW3b-3B**
Capital Cost Sub-Element
Annual Site Inspection

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the annual site inspection to inspect the integrity of the all the components of the remedy put in place. It includes costs for on-site labor, equipment, materials.

Cost Analysis:
Cost for Annual Site Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6C	Site Inspection - 1 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$413.09	$413.09	$413.09	8%	9%	$486	MII MII Assemblies	1 day/year
M11	Site Inspection Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,000.00	$1,000.00	$1,000.00	0%	0%	$1,000	A Allowance	
												TOTAL UNIT COST:			$1,486		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3b-4A

Alternative 3b **Cost Worksheet:** **CW3b-4A**
Capital Cost Sub-Element
Construction of Soil Cover

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the construction of a soil cover over contaminated areas. The orange construction fence is a visible marker layer to be placed below the cover. This sub-element includes cost for labor, equipment and material (soil from offsite borrow area).

Cost Analysis:
Cost for Construction of Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Subsoil Placement Over Contaminated Soil																
A11A	Clean Fill Spreading/Grading	214	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.51	$2.51	$537.14	8%	9%	$632	MII MII Assemblies	
A22A	Clean Fill Compaction - Small Area	214	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.09	$2.09	$447.26	8%	9%	$527	MII MII Assemblies	
M39A	Orange Fence	5,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.00	$0.08	$400.00	8%	9%	$471	V Vendor Quote	Includes purchase and delivery to the Site.
	Topsoil Placement for Cover																
A11A	Clean Fill Spreading/Grading	107	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.51	$2.51	$268.57	8%	9%	$316	MII MII Assemblies	
A22A	Clean Fill Compaction - Small Area	107	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.09	$2.09	$223.63	8%	9%	$263	MII MII Assemblies	Assume 10% of total fill
	Clean Fill (Subsoil) and Top Soil																
M45	Subsoil, Delivered	214	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$8.14	$0.00	$8.14	$1,741.96	8%	9%	$2,051	V Vendor Quote	Includes purchase and delivery to the Site.
M45A	Topsoil Amended, Delivered	107	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$33.17	$0.00	$33.17	$3,549.19	8%	9%	$4,178	V Vendor Quote	Includes purchase and delivery to the Site.
												TOTAL UNIT COST:			$8,438		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-4B

Alternative 3b **Cost Worksheet: CW3b-4B**
Capital Cost Sub-Element
Contaminated Soil Removal and Disposal

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the removal of contaminated soil and hauling and handling costs of excavated contaminated soil for offiste disposal at the Former Libby Vermiculite Mine. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Contaminated Soil Removal and Disposal (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Removal of Contaminated Soil																
A8A	Excavation/Loading - Contaminated Soils	372	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9.11	$9.11	$3,388.92	8%	9%	$3,989	MII MII Assemblies	
	Hauling and Disposal																
A23A	Hauling Offsite - Former Libby Vermiculite Mine	428	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.31	$5.31	$2,272.68	8%	9%	$2,675	MII MII Assemblies	
S3A	Contaminated Soils Handling at the Mine	589	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.67	$5.67	$3,336.69	8%	9%	$3,928	V Vendor Quote	Includes labor, material and equipment cost
												TOTAL UNIT COST:			$10,592		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-4C

Alternative 3b **Cost Worksheet: CW3b-4C**
Capital Cost Sub-Element
Backfilling of Excavated Area

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the backfilling of the excavated area. The backfill would include a subsoil layer placed below an amended topsoil layer. The orange construction fence is a visible marker layer to be placed in the bottom of the excavation. This sub-element includes cost for labor, equipment and material (soil from offsite borrow area).

Cost Analysis:
Cost for Backfilling of Excavated Area (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Clean Fill (Subsoil) and Top Soil																
M45	Subsoil, Delivered	214	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$8.14	$0.00	$8.14	$1,741.96	8%	9%	$2,051	V Vendor Quote	Includes purchase and delivery to the Site.
M45A	Topsoil Amended, Delivered	214	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$33.17	$0.00	$33.17	$7,098.38	8%	9%	$8,356	V Vendor Quote	Includes purchase and delivery to the Site.
	Subsoil Replacement and Compaction																
A11A	Clean Fill Spreading/Grading	214	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.51	$2.51	$537.14	8%	9%	$632	MII MII Assemblies	
A22A	Clean Fill Compaction - Small Area	214	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.09	$2.09	$447.26	8%	9%	$527	MII MII Assemblies	
M39A	Orange Fence	10,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.08	$0.00	$0.08	$800.00	8%	9%	$942	V Vendor Quote	Includes purchase and delivery to the Site.
	Topsoil Replacement and Compaction																
A11A	Clean Fill Spreading/Grading	214	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.51	$2.51	$537.14	8%	9%	$632	MII MII Assemblies	
A22A	Clean Fill Compaction - Small Area	214	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.09	$2.09	$447.26	8%	9%	$527	MII MII Assemblies	
												TOTAL UNIT COST:			$13,667		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-5

Alternative 3b **Cost Worksheet: CW3b-5**
Capital Cost Sub-Element
Hydroseeding of Soil Cover and Excavation Backfill Area

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves the revegetation of the soil cover and excavation backfill area with hydroseeding. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Hydroseeding of Soil Cover and Excavation Backfill Area (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hydroseeding																
A30A	Hydro-Seeding Crew	0.50	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$77.25	$77.25	$38.63	8%	9%	$45	MII MII Assemblies	
M20	Seed, Hydromulch with Fertilizer	15,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.04	$0.00	$0.04	$600.00	8%	9%	$706	CW09 32 92 1914 3100	Includes material
												TOTAL UNIT COST:			$751		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Field work will be in Level "C" PPE.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-6

Alternative 3b **Cost Worksheet: CW3b-6**
Capital Cost Sub-Element
Mobilization/Demobilization

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves mobilization and demobilization of all the required equipment to and from the site respectively.

Cost Analysis:
Cost for Mobilization/Demobilization (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A37B	Mobilization and Demobilization - Medium-Sizec Equipment	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$581.76	$581.76	$1,163.52	8%	9%	$1,370	MII MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$274.46	$274.46	$548.92	8%	9%	$646	MII MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,352.95	$1,352.95	$2,705.90	8%	9%	$3,185	MII MII Assemblies	
												TOTAL UNIT COST:			$5,201		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE. MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-7

Alternative 3b **Cost Worksheet: CW3b-7**
Capital Cost Sub-Element
Surveying for Construction Control

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves cost for site surveying before and after the remedial alternative is implemented.

Cost Analysis:
Cost for Surveying for Construction Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A38A	Site Survey - Clean Area	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$534.80	$534.80	$534.80	8%	9%	$630	MII MII Assemblies	
A38B	Site Survey - Contaminated Area	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,067.20	$1,067.20	$1,067.20	8%	9%	$1,256	MII MII Assemblies	
M12A	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
												TOTAL UNIT COST:			$6,886		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-8

Alternative 3b **Cost Worksheet:** **CW3b-8**
Capital Cost Sub-Element
Equipment Decontamination

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves decontamination of equipment used onsite. Water for decon/washing will be used from either the onsite pumphouse or the Kootenai River with no cost for the water.

Cost Analysis:
Cost for Equipment Decontamination (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Equipment Decon/Washing																
A3A	Equipment Decon/Washing	17	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$141.90	$141.90	$2,412.30	8%	9%	$2,840	MII MII Assemblies	
M46	Poly Tank, 5,300 Gal	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$7,231.06	$0.00	$7,231.06	$7,231.06	8%	9%	$8,512	V Vendor Quote	Includes purchase and delivery to the Site.
												TOTAL UNIT COST:			$11,352		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE. MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-9

Alternative 3b **Cost Worksheet: CW3b-9**
Capital Cost Sub-Element
Site Maintenance and Control During Construction

COST WORKSHEET

Site: OU2 - Former Screening Plant **Prepared By:** AS **Date:** 8/19/2009
Location: Libby, Montana
Phase: Final Feasibility Study **Checked By:** GH **Date:** 8/20/2009
Base Year: 2009

Work Statement:
This sub-element involves site maintenance during construction. The annual costs for site maintenance during construction include labor, material, and equipment.

Cost Analysis:
Cost for Site Maintenance and Control During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Dust Control																
A1A	Dust Control/Washing	17	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$680.36	$680.36	$11,566.12	8%	9%	$13,616	MII MII Assemblies	Includes onsite dust control and pavement washing
	Equipment Fueling																
A2A	Equipment Fueling	17	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$126.76	$126.76	$2,154.92	8%	9%	$2,537	MII MII Assemblies	
	Construction Safety and Traffic Control																
A33A	Barricade and Traffic Control Setup	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,017.01	$1,017.01	$1,017.01	8%	9%	$1,197	MII MII Assemblies	
M36	3" x 1,000' Yellow Caution Tape	1	RL	1.00	$0.00	$0.00	$0.00	$0.00	$16.47	$0.00	$16.47	$16.47	8%	9%	$19	V Vendor Quote	Includes purchase and delivery to the Site.
M37	3" x 1,000' Red Danger Asbestos Haz Tape	1	RL	1.00	$0.00	$0.00	$0.00	$0.00	$16.47	$0.00	$16.47	$16.47	8%	9%	$19	V Vendor Quote	Includes purchase and delivery to the Site.
M38	Reflecting Barricade with Light	4	EA	1.00	$0.00	$0.00	$0.00	$0.00	$79.80	$0.00	$79.80	$319.20	8%	9%	$376	V Vendor Quote	Includes purchase and delivery to the Site.
M39	Orange Safety Fence with Post	2	CLF	1.00	$0.00	$0.00	$0.00	$0.00	$94.29	$0.00	$94.29	$188.58	8%	9%	$222	V Vendor Quote	Includes purchase and delivery to the Site.
												TOTAL UNIT COST:			$17,986		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3b-10

Alternative 3b **Cost Worksheet:** **CW3b-10**
Capital Cost Sub-Element
Borrow Material Sampling

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves determining whether asbestos fibers are present in the borrow source. The following includes the labor, material and equipment cost, and shipping cost required for the borrow material sampling.

Cost Analysis:
Cost for Borrow Material Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$866.39	$866.39	$866.39	8%	9%	$1,020	MII MII Assemblies	
M50	Soil Sample Analysis (PLM-VE)	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.75	$25.75	$25.75	8%	9%	$30	P Previous Work	
M50A	Soil Sample Analysis (Stereomicroscopy)	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.75	$25.75	$25.75	8%	9%	$30	P Previous Work	
M54D	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$500.00	$500.00	$500.00	8%	9%	$589	A Allowance	
M53D	Sampling/Other Supplies	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$257.50	$257.50	$257.50	8%	9%	$303	P Previous Work	
												TOTAL UNIT COST:			$1,972		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

TABLE CW3b-11

Alternative 3b | **Cost Worksheet:** **CW3b-11**
Capital Cost Sub-Element
Community Awareness Activities

COST WORKSHEET

Site: OU2 - Former Screening Plant
Location: Libby, Montana
Phase: Final Feasibility Study
Base Year: 2009

Prepared By: AS **Date:** 8/19/2009
Checked By: GH **Date:** 8/20/2009

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of Former Screening Plant site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes costs for renting a meeting hall, court reporter, and publishing and sending notices or informational flyers.

Cost Analysis:
Cost for Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	16	HR	1.00	$59.86	$59.86	$0.00	$0.00	$0.00	$0.00	$59.86	$957.76	100%	9%	$2,088	SE SalaryExpert.com	8 hrs per day
L13	Project Manager	16	HR	1.00	$49.87	$49.87	$0.00	$0.00	$0.00	$0.00	$49.87	$797.92	100%	9%	$1,739	SE SalaryExpert.com	8 hrs per day
M56	Per Diem for 2 Person	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$218.00	$218.00	$436.00	0%	0%	$436	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,000.00	$2,000.00	$2,000.00	0%	0%	$2,000	A Allowance	1 meeting per 5-yr review.
												TOTAL UNIT COST:			$6,263		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2009 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Mar 2009.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor. Professional labor overhead is 100%. Allowances and items with mandated costs such as per diem do not have overhead and profit applied.

Cost Estimate Backup

Libby OU2 Former Screening Plant
Surface Area and Perimeter Calculations

Area	Area Name	Area (SF)	Area (SF) - Rounded to ~ 100	Area (SF) - Adjusted for Slope	Comments
North	Highway 37 Embankment	2500.00	2500.00	3300.00	
South	Highway 37 Embankment	1300.00	1300.00	1700.00	
1-03000	Sample Area 1-03000	10000.00	10000.00	10000.00	
Total			**13800.00**	**15000.00**	

Area	Area Name	Perimeter (FT)	Perimeter (FT) - Rounded to ~ 10	Perimeter (FT) - Adjusted for Slope	Perimeter (FT) - Combined
North	Seasonally Flooded Area	1210.00	1210.00	1210.00	3330.00
South	Seasonally Flooded Area	2120.00	2120.00	2120.00	
Total			**3330.00**	**3330.00**	

COST INDICES FOR ESCALATION

Base Year for Work: **2009**

Year	Cost Index[1]
1990	398.34
1991	406.78
1992	415.22
1993	427.83
1994	439.45
1995	452.31
1996	462.16
1997	472.17
1998	478.10
1999	486.21
2000	497.07
2001	503.52
2002	517.46
2003	529.95
2004	571.29
2005	608.36
2006	641.91
2007	673.52
2008	693.30
2009	708.72
2010	723.61
2011	738.08
2012	752.84
2013	767.90
2014	783.26
2015	798.92
2016	814.90
2017	831.20
2018	847.82
2019	864.78
2020	882.08
2021	899.72
2022	917.71
2023	936.07
2024	954.79
2025	973.88

[1] Yearly composite cost index (weighted average) from the U.S. Army Corps of Engineers Civil Works Construction Cost Index System (CWCCIS), EM 1110-2-1304, 31 March 2000. Revised as of 30 September 2007.

SalaryExpert Cost Sources

Base Year: 2009

COST CODES FOR LABOR AND UNIT COSTS

Cost Code	Description	Units	Unit Labor Cost	Unit Equipment Cost	Unit Material Cost	Unit Other Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Labor Cost	Adjusted Equipment Cost	Adjusted Material Cost	Adjusted Other Cost	PC OH	PC PF	Cost Source: Source	Cost Source: Source ID	Comments
L1	CAD Drafter	HR	**$25.80**	$0.00	$0.00	$0.00	2009	1	1	$25.80	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L2	Civil Engineer	HR	**$36.53**	$0.00	$0.00	$0.00	2009	1	1	$36.53	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L3	Clerks, Typist, Bookkeeper & Receptionist	HR	**$22.83**	$0.00	$0.00	$0.00	2009	1	1	$22.83	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L4	Electrical Engineer	HR	**$37.53**	$0.00	$0.00	$0.00	2009	1	1	$37.53	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L5	Environmental Engineer	HR	**$31.87**	$0.00	$0.00	$0.00	2009	1	1	$31.87	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L6	Environmental Lawyer	HR	**$34.78**	$0.00	$0.00	$0.00	2009	1	1	$34.78	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L7	Environmental Scientist	HR	**$30.43**	$0.00	$0.00	$0.00	2009	1	1	$30.43	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L8	Field Engineer	HR	**$32.30**	$0.00	$0.00	$0.00	2009	1	1	$32.30	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L9	Field Foreman	HR	**$26.47**	$0.00	$0.00	$0.00	2009	1	1	$26.47	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L10	Field Technician	HR	**$23.01**	$0.00	$0.00	$0.00	2009	1	1	$23.01	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L11	Geologist	HR	**$33.87**	$0.00	$0.00	$0.00	2009	1	1	$33.87	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L12	General Superintendent (P.M.)	HR	**$59.86**	$0.00	$0.00	$0.00	2009	1	1	$59.86	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L13	Project Manager	HR	**$49.87**	$0.00	$0.00	$0.00	2009	1	1	$49.87	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L14	Quality Control Engineer	HR	**$35.79**	$0.00	$0.00	$0.00	2009	1	1	$35.79	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L15	Paralegal	HR	**$21.42**	$0.00	$0.00	$0.00	2009	1	1	$21.42	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L18	Suveyor	HR	**$42.05**	$0.00	$0.00	$0.00	2009	1	1	$42.05	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L19	Suveyor Assistant	HR	**$24.80**	$0.00	$0.00	$0.00	2009	1	1	$24.80	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	

Base Year: 2009

COST CODES FOR MATERIAL AND UNIT COSTS

Cost Code	Description	Units	Unit Labor Cost	Unit Equipment Cost	Unit Material Cost	Unit Other Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Labor Cost	Adjusted Equipment Cost	Adjusted Material Cost	Adjusted Other Cost	PC OH	PC PF	Cost Source: Source	Cost Source: Source ID	Comments
M4	Pipe, Galvanized Pipe, 2 1/2" Dia, 6' High	EA	$0.00	$0.00	**$18.03**	$0.00	2009	1	1	$0.00	$0.00	$18.03	$0.00	8%	9%	V	Vendor Quote	
M5	Chainlink Fence with Fittings & Accessories	LF	$0.00	$0.00	**$13.02**	$0.00	2009	1	1	$0.00	$0.00	$13.02	$0.00	8%	9%	V	Vendor Quote	8' high fence. Includes all fittings and accessories along with 2 x 12' swing gates
M9	Asbestos Warning Signs	EA	$0.00	$0.00	**$77.46**	$0.00	2009	1	1	$0.00	$0.00	$77.46	$0.00	8%	9%	V	Vendor Quote	Warning signs 20" x 14" with posts
M10A	Copy and Shipping Allowance	LS	$0.00	$0.00	$0.00	**$1,500**	2009	1	1	$0.00	$0.00	$0.00	$1,500.00	0%	0%	A	Allowance	
M11	Site Inspection Report Allowance	LS	$0.00	$0.00	$0.00	**$1,000**	2009	1	1	$0.00	$0.00	$0.00	$1,000.00	0%	0%	A	Allowance	
M11A	Document Submission and Recording Allowance	LS	$0.00	$0.00	$0.00	**$5,000**	2009	1	1	$0.00	$0.00	$0.00	$5,000.00	0%	0%	A	Allowance	
M12	Surveying Report Allowance	LS	$0.00	$0.00	$0.00	**$15,000.00**	2009	1	1	$0.00	$0.00	$0.00	$15,000.00	0%	0%	A	Allowance	
M12A	Surveying Report Allowance	LS	$0.00	$0.00	$0.00	**$5,000.00**	2009	1	1	$0.00	$0.00	$0.00	$5,000.00	0%	0%	A	Allowance	
M20	Seed, Hydromulch with Fertilizer	SF	$0.00	$0.00	**$0.04**	$0.00	2009	1	1	$0.00	$0.00	$0.04	$0.00	8%	9%	CW09	32 92 1914 3100	Includes material
M20A	Sod Including Installation	SF	$0.00	$0.00	$0.00	**$0.69**	2009	1	1	$0.00	$0.00	$0.00	$0.69	8%	9%	CW09	32 92 2310 1700	Includes material and installation.
M21	Erosion Repair Material Allowance	LS	$0.00	$0.00	$0.00	**$3,000.00**	2009	1	1	$0.00	$0.00	$0.00	$3,000.00	0%	0%	A	Allowance	
M21B	Erosion Repair Material Allowance	LS	$0.00	$0.00	$0.00	**$1,500.00**	2009	1	1	$0.00	$0.00	$0.00	$1,500.00	0%	0%	A	Allowance	
M22	Sign Maintenance Allowance	LS	$0.00	$0.00	$0.00	**$500.00**	2009	1	1	$0.00	$0.00	$0.00	$500.00	0%	0%	A	Allowance	
M36	3" x 1,000' Yellow Caution Tape	RL	$0.00	$0.00	**$16.47**	$0.00	2009	1	1	$0.00	$0.00	$16.47	$0.00	8%	9%	V	Vendor Quote	Includes purchase and delivery to the Site.
M37	3" x 1,000' Red Danger Asbestos Haz Tape	RL	$0.00	$0.00	**$16.47**	$0.00	2009	1	1	$0.00	$0.00	$16.47	$0.00	8%	9%	V	Vendor Quote	Includes purchase and delivery to the Site.
M38	Reflecting Barricade with Light	EA	$0.00	$0.00	**$79.80**	$0.00	2009	1	1	$0.00	$0.00	$79.80	$0.00	8%	9%	V	Vendor Quote	Includes purchase and delivery to the Site.
M39	Orange Safety Fence with Post	CLF	$0.00	$0.00	**$94.29**	$0.00	2009	1	1	$0.00	$0.00	$94.29	$0.00	8%	9%	V	Vendor Quote	Includes purchase and delivery to the Site.
M39A	Orange Fence	SF	$0.00	$0.00	**$0.08**	$0.00	2009	1	1	$0.00	$0.00	$0.08	$0.00	8%	9%	V	Vendor Quote	Includes purchase and delivery to the Site.
M43B	Gravel, Delivered	LCY	$0.00	$0.00	**$9.50**	$0.00	2009	1	1	$0.00	$0.00	$9.50	$0.00	8%	9%	V	Vendor Quote	
M44A	Riprap, Delivered	TN	$0.00	$0.00	**$49.50**	$0.00	2009	1	1	$0.00	$0.00	$49.50	$0.00	8%	9%	V	Vendor Quote	
M44B	Riprap, Delivered	LCY	$0.00	$0.00	**$69.50**	$0.00	2009	1	1	$0.00	$0.00	$69.50	$0.00	8%	9%	V	Vendor Quote	
M45	Subsoil, Delivered	LCY	$0.00	$0.00	**$7.90**	$0.00	2008	1.03	1	$0.00	$0.00	$8.14	$0.00	8%	9%	V	Vendor Quote	Includes purchase and delivery to the Site.
M45A	Topsoil Amended, Delivered	LCY	$0.00	$0.00	**$32.20**	$0.00	2008	1.03	1	$0.00	$0.00	$33.17	$0.00	8%	9%	V	Vendor Quote	Includes purchase and delivery to the Site.
M46	Poly Tank, 5,300 Gal	EA	$0.00	$0.00	**$7,231.06**	$0.00	2009	1	1	$0.00	$0.00	$7,231.06	$0.00	8%	9%	V	Vendor Quote	Includes purchase and delivery to the Site.
M48	Weed Control Services Allowance	ACR	$0.00	$0.00	$0.00	**$100.00**	2009	1	1	$0.00	$0.00	$0.00	$100.00	8%	9%	A	Allowance	
M48A	Grass Maintenance Allowance	ACR	$0.00	$0.00	$0.00	**$100.00**	2009	1	1	$0.00	$0.00	$0.00	$100.00	8%	9%	A	Allowance	
M48B	Concrete Maintenance Allowance	ACR	$0.00	$0.00	$0.00	**$450.00**	2009	1	1	$0.00	$0.00	$0.00	$450.00	8%	9%	A	Allowance	
M49	O&M Allowance	ACR	$0.00	$0.00	$0.00	**$150.00**	2009	1	1	$0.00	$0.00	$0.00	$150.00	0%	0%	A	Allowance	Includes cost for cover maintenance, erosion repair, and repair of fencing/signs.
M50	Soil Sample Analysis (PLM-VE)	EA	$0.00	$0.00	$0.00	**$25.00**	2008	1.03	1	$0.00	$0.00	$0.00	$25.75	8%	9%	P	Previous Work	
M50A	Soil Sample Analysis (Stereomicroscopy)	EA	$0.00	$0.00	$0.00	**$25.00**	2008	1.03	1	$0.00	$0.00	$0.00	$25.75	8%	9%	P	Previous Work	
M53B	Sampling/Other Supplies	LS	$0.00	$0.00	$0.00	**$1,500.00**	2008	1.03	1	$0.00	$0.00	$0.00	$1,545.00	8%	9%	P	Previous Work	
M53D	Sampling/Other Supplies	LS	$0.00	$0.00	$0.00	**$250.00**	2008	1.03	1	$0.00	$0.00	$0.00	$257.50	8%	9%	P	Previous Work	
M54B	Sample Shipping Allowance	LS	$0.00	$0.00	$0.00	**$2,000.00**	2009	1	1	$0.00	$0.00	$0.00	$2,000.00	0%	0%	A	Allowance	For 1 Event
M54C	Sample Shipping	EA	$0.00	$0.00	$0.00	**$120.00**	2008	1.03	1	$0.00	$0.00	$0.00	$123.60	8%	9%	P	Previous Work	15 Samples per shipment
M54D	Sample Shipping Allowance	LS	$0.00	$0.00	$0.00	**$500.00**	2009	1	1	$0.00	$0.00	$0.00	$500.00	8%	9%	A	Allowance	
M55	Per Diem for 3 Person	DY	$0.00	$0.00	$0.00	**$327.00**	2009	1	1	$0.00	$0.00	$0.00	$327.00	0%	0%	GSA	www.gsa.gov	
M56	Per Diem for 2 Person	DY	$0.00	$0.00	$0.00	**$218.00**	2009	1	1	$0.00	$0.00	$0.00	$218.00	0%	0%	GSA	www.gsa.gov	
M57	Per Diem for 1 Person	DY	$0.00	$0.00	$0.00	**$109.00**	2009	1	1	$0.00	$0.00	$0.00	$109.00	0%	0%	GSA	www.gsa.gov	
M51A	Ambient Air Sample Analysis	EA	$0.00	$0.00	$0.00	**$400.00**	2008	1.03	1	$0.00	$0.00	$0.00	$412.00	8%	9%	P	Previous Work	Analyzed by TEM ISO Method 10312
M52A	Sampling Setup (Equipment and Utility)	LS	$0.00	$0.00	$0.00	**$4,200.00**	2008	1.03	1	$0.00	$0.00	$0.00	$4,326.00	8%	9%	P	Previous Work	Includes sampling equipments and electrical hook-up
M52B	Equipment/Ambient Air Sampling Event	EA	$0.00	$0.00	$0.00	**$150.00**	2008	1.03	1	$0.00	$0.00	$0.00	$154.50	8%	9%	P	Previous Work	
M53C	Sampling/Other Supplies/Ambient Air Sampling Event	LS	$0.00	$0.00	$0.00	**$1,500.00**	2008	1.03	1	$0.00	$0.00	$0.00	$1,545.00	8%	9%	P	Previous Work	
M65	Community Awareness Activities Allowance	EA	$0.00	$0.00	$0.00	**$2,000.00**	2009	1	1	$0.00	$0.00	$0.00	$2,000.00	0%	0%	A	Allowance	1 meeting per 5-yr review.

Base Year: 2009

COST CODES FOR SUBCONTRACTORS AND UNIT COSTS

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Unit Cost	PC OH	PC PF	Cost Source: Source	Cost Source: Source ID	Comments
S1A	Asphalt Pavement Construction	Asphalt Pavement Construction - Resurfacing Only	SF	**$3.00**	2008	1.03	1	$3.09	8%	9%	V	Vendor Quote	Includes labor, material and equipment cost
S2A	Asphalt Pavement Construction	Asphalt Pavement Construction - Base and Surfacing	SF	**$5.40**	2008	1.03	1	$5.56	8%	9%	V	Vendor Quote	Includes labor, material and equipment cost
S3A	Contaminated Soils Handling	Contaminated Soils Handling at the Mine	TN	**$5.50**	2008	1.03	1	$5.67	8%	9%	V	Vendor Quote	Includes labor, material and equipment cost
				.									

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	MII Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted MII Unit Cost	PC OH	PC PF	Cost Source: Source	Cost Source: Source ID	Comments
A1A	Dust Control	Dust Control/Washing	DY	**$680.36**	2009	1.00	1	$680.36	8%	9%	MII	MII Assemblies	
A2A	Equipment Fueling	Equipment Fueling	DY	**$126.76**	2009	1.00	1	$126.76	8%	9%	MII	MII Assemblies	
A3A	Equipment Decon/Washing	Equipment Decon/Washing	DY	**$141.90**	2009	1.00	1	$141.90	8%	9%	MII	MII Assemblies	
A4A	Sampling - 2 Person Crew	Sampling - 2 Person Crew	DY	**$866.39**	2009	1.00	1	$866.39	8%	9%	MII	MII Assemblies	
A5A	Sampling - 3 Person Crew	Sampling - 3 Person Crew	DY	**$1,253.12**	2009	1.00	1	$1,253.12	8%	9%	MII	MII Assemblies	
A6A	Site Inspection - 2 Person Crew	Site Inspection - 2 Person Crew	DY	**$821.88**	2009	1.00	1	$821.88	8%	9%	MII	MII Assemblies	
A6B	Visual Inspection - 2 Person Crew	Visual Inspection - 2 Person Crew	DY	**$821.88**	2009	1.00	1	$821.88	8%	9%	MII	MII Assemblies	
A6C	Site Inspection - 1 Person Crew	Site Inspection - 1 Person Crew	DY	**$413.09**	2009	1.00	1	$413.09	8%	9%	MII	MII Assemblies	
A6D	Visual Inspection - 1 Person Crew	Visual Inspection - 1 Person Crew	DY	**$413.09**	2009	1.00	1	$413.09	8%	9%	MII	MII Assemblies	
A7A	Site Operations and Maintenance	Operations and Maintenance Crew	DY	**$692.47**	2009	1.00	1	$692.47	8%	9%	MII	MII Assemblies	
A7B	Site Operations and Maintenance	Fence Maintenance Crew	DY	**$692.47**	2009	1.00	1	$692.47	8%	9%	MII	MII Assemblies	
A8A	Excavation/Loading - Contaminated Soils	Excavation/Loading - Contaminated Soils	BCY	**$9.11**	2009	1.00	1	$9.11	8%	9%	MII	MII Assemblies	
A11A	Grading - Clean Fill Loading/Spreading/Grading	Clean Fill Spreading/Grading	LCY	**$2.51**	2009	1.00	1	$2.51	8%	9%	MII	MII Assemblies	
A14A	Material Loading - Contaminated Soils	Material Loading - Contaminated Soils	LCY	**$0.82**	2009	1.00	1	$0.82	8%	9%	MII	MII Assemblies	
A15A	Material Placement - Riprap	Riprap Placement	LCY	**$7.41**	2009	1.00	1	$7.41	8%	9%	MII	MII Assemblies	
A15B	Material Placement - Riprap	Riprap Placement	TN	**$3.71**	2009	1.00	1	$3.71	8%	9%	MII	MII Assemblies	
A15C	Material Placement - Riprap	Riprap Removal	LCY	**$7.41**	2009	1.00	1	$7.41	8%	9%	MII	MII Assemblies	
A16A	Material Placement - Fill/Subsoil/Topsoil - Clean Fill	Clean Fill/Subsoil/Topsoil Placement	LCY	**$1.70**	2009	1.00	1	$1.70	8%	9%	MII	MII Assemblies	
A17A	Material Placement - Sand/Gravel Placement	Sand/Gravel Placement	LCY	**$1.70**	2009	1.00	1	$1.70	8%	9%	MII	MII Assemblies	
A18A	Gravel Placement - Clean Area	Gravel Placement - Clean Area	SY	**$0.28**	2009	1.00	1	$0.28	8%	9%	MII	MII Assemblies	
A18B	Gravel Placement - Contaminated Area	Gravel Placement - Contaminated Area	SY	**$1.29**	2009	1.00	1	$1.29	8%	9%	MII	MII Assemblies	
A21A	Compaction - Large Open Area - Clean Fill	Clean Fill Compaction - Large Open Area	LCY	**$0.17**	2009	1.00	1	$0.17	8%	9%	MII	MII Assemblies	
A22A	Compaction - Small Area - Clean Fill	Clean Fill Compaction - Small Area	LCY	**$2.09**	2009	1.00	1	$2.09	8%	9%	MII	MII Assemblies	
A23A	Hauling Offsite - Former Libby Vermiculite Mine	Hauling Offsite - Former Libby Vermiculite Mine	LCY	**$5.31**	2009	1.00	1	$5.31	8%	9%	MII	MII Assemblies	
A23B	Hauling Offsite - Former Libby Vermiculite Mine	Hauling Offsite - Former Libby Vermiculite Mine	HR	**$84.44**	2009	1.00	1	$84.44	8%	9%	MII	MII Assemblies	
A30A	Hydro-Seeding Crew	Hydro-Seeding Crew	ACR	**$77.25**	2009	1.00	1	$77.25	8%	9%	MII	MII Assemblies	
A31A	Fence Installation	Fence Installation - Contaminated Area	LF	**$28.82**	2009	1.00	1	$28.82	8%	9%	MII	MII Assemblies	
A31B	Fence Installation	Fence Installation - Clean Area	LF	**$5.81**	2009	1.00	1	$5.81	8%	9%	MII	MII Assemblies	
A31C	Signage Installation	Signage Installation - Clean Area	HR	**$148.29**	2009	1.00	1	$148.29	8%	9%	MII	MII Assemblies	
A32A	Clearing and Grubbing	Clearing and Grubbing	ACR	**$8,500.41**	2009	1.00	1	$8,500.41	8%	9%	MII	MII Assemblies	
A33A	Barricade and Traffic Control	Barricade and Traffic Control Setup	DY	**$1,017.01**	2009	1.00	1	$1,017.01	8%	9%	MII	MII Assemblies	
A34A	Asphalt Work	Asphalt Work	SY	**$16.07**	2009	1.00	1	$16.07	8%	9%	MII	MII Assemblies	
A35A	Concrete Work	Concrete Work	SY	**$34.17**	2009	1.00	1	$34.17	8%	9%	MII	MII Assemblies	Includes material (12" of concrete and 6" of gravel/sand base), labor, equipment and placement costs
A35B	Concrete Work	Concrete Work	SY	**$18.73**	2009	1.00	1	$18.73	8%	9%	MII	MII Assemblies	Includes material (6" of concrete and 6" of gravel/sand base), labor, equipment and placement costs
A37A	Mobilization and Demobilization - Heavy Equipment	Mobilization and Demobilization - Heavy Equipment	EA	**$1,430.01**	2009	1.00	1	$1,430.01	8%	9%	MII	MII Assemblies	
A37B	Mobilization and Demobilization - Medium-Sized Equipment	Mobilization and Demobilization - Medium-Sized Equipment	EA	**$581.76**	2009	1.00	1	$581.76	8%	9%	MII	MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	Mobilization and Demobilization - Small Equipment	EA	**$274.46**	2009	1.00	1	$274.46	8%	9%	MII	MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	Mobilization and Demobilization - Self-Propelled Equipment	EA	**$1,352.95**	2009	1.00	1	$1,352.95	8%	9%	MII	MII Assemblies	
A38A	Site Survey	Site Survey - Clean Area	DY	**$534.80**	2009	1.00	1	$534.80	8%	9%	MII	MII Assemblies	
A38B	Site Survey	Site Survey - Contaminated Area	DY	**$1,067.20**	2009	1.00	1	$1,067.20	8%	9%	MII	MII Assemblies	

Description: Determine cycle time for rigid frame truck required for short haul and long haul distances.

	Truck Trailer	
Type of truck (make and model):	**---**	
Hauling capacity (CY):	**28.0**	*MII Equipment Library*
	Track Loader	
Type of loader (make and model):	**CAT - 963C**	
Loader capacity (CY):	**2.6**	*Heaped (Ref: CAT Performance Handbook-31, Page 14-8)*
Load time (min):	0.1	*963C Travel Time, CAT Perf. Handbook-31, Page 14-16*
Maneuver time (min):	0.2	*963C Travel Time, CAT Perf. Handbook-31, Page 14-17*
Travel time, Empty (min):	0.2	*Assume 50ft, 963C Travel Time, CAT Perf. Handbook-31, Page 14-22*
Dump time (min):	0.1	*963C Travel Time, CAT Perf. Handbook-31, Page 14-17*
Number of bucket volume required to fill the truck:	11.0	*Truck capacity / Loader capacity*
Total loader travel time (min):	**6.60**	
Loader production output (CY/Hr):	130	*Means Productivity Std for Construction, 3rd Ed, 022.200.238.1300*
Loader production output for safety level C (CY/Hr):	55	*Assume 42%, EPA CE Guide (EAP 540-R-00-002), Exhibit B-4*
Loading time for one volume of load (min):	2.9	*Volume of 9.2 CY (Loader capacity)*
Number of bucket volume required to fill the truck:	11.0	*Truck capacity / Loader capacity*
Total loading time (min):	**31.9**	
Total loading time (min):	**38.50**	
	Cycle Time for Trucks	
	Hauling - Former Libby Vermiculite Mine	
Cycle distance (miles):	**16.00**	*Loaded + empty travel distance*
Truck average speed (MPH):	35.00	*Assumed*
Time required for travel (Hr):	0.46	*Loaded + empty travel time*
Truck loading at site (Hr):	0.65	
Truck unloading at landfill site (Hr):	0.65	*Assumed*
Total cycle time for long haul (Hr):	**1.76**	
Productivity per hour for long haul (CY/Hr):	**15.91**	

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CDM Federal Programs Corporation

PROJECT:	Libby OU1 Final FS	COMPUTED BY :	AS	CHECKED BY:	AB
JOB NO.:	2616.015.208.FSOU1	DATE :	7/31/2009	DATE CHECKED:	7/31/2009
CLIENT:	Volpe/EPA			PAGE NO. :	LB-01

Description: Determination of base wage rates for general construction personnel (i.e., labor, equipment operators, etc.). Wage rates based on Davis-Bacon MT20080002 (Highway) Statewide, Montana Decision Number: MT20080002 06/26/2009. Fringe rates were assumed where Davis-Bacon determination did not set fringe rates.

Taxes, Insurance and Overhead:

- Taxes, insurance, and overhead are included in the MII estimate.

Escalation:

Previous salary cost index (4Q09): **724.52**

Cost estimate prep cost index (4Q09): **724.52**

Base Pay:

The hourly wage rates for Libby falls under Zone 3: Over 60 miles from Kalispell County Court House - **Base Pay + $4.00**

Labor Category	Hourly Rate	Adjusted Hourly Rate	Fringe	Year	Source
Electrician	$20.54	$24.54	$4.48	2009	Davis-Bacon MT20080002 (Highway)
Laborers					
Laborer Group 1	$17.18	$21.18	$6.75	2009	Davis-Bacon MT20080002 (Highway)
Laborer Group 2	$19.97	$23.97	$6.75	2009	Davis-Bacon MT20080002 (Highway)
Laborer Group 3	$20.17	$24.17	$6.75	2009	Davis-Bacon MT20080002 (Highway)
Laborer Group 4	$21.07	$25.07	$6.75	2009	Davis-Bacon MT20080002 (Highway)
Painter	$24.00	$28.00	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Group 1 PEO					
A-Frame Truck Crane Operator	$21.52	$25.52	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Auto Fine Grader Operator	$21.52	$25.52	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Front-End Loader Operator	$21.52	$25.52	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Pumpman Operator	$21.52	$25.52	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Oiler	$21.52	$25.52	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Group 2 PEO					
Backhoe/Excavator Operator	$23.55	$27.55	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Dozer Operator	$23.55	$27.55	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Front-End Loader Operator	$23.55	$27.55	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Power Saw Operator	$23.55	$27.55	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Roller Operator	$23.55	$27.55	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Washing Plant Operator	$23.55	$27.55	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Group 3 PEO					
Backhoe/Excavator Operator	$24.41	$28.41	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Finish Dozer Operator	$24.41	$28.41	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Dozer Operator	$24.41	$28.41	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Scraper Operator	$24.41	$28.41	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Front-End Loader Operator	$24.41	$28.41	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Crane Operator	$24.41	$28.41	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Asphalt Paving Machine	$24.41	$28.41	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Concrete Paving Machine	$24.41	$28.41	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Heavy Equipment Operator	$24.41	$28.41	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Group 4 PEO					
Finish Scraper Operator	$25.10	$29.10	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Crane Operator	$25.10	$29.10	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Group 5 PEO					
Crane Operator	$26.44	$30.44	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Group 6 PEO					
Crane Operator	$27.13	$31.13	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Group 7 PEO					
Crane Operator	$29.23	$33.23	$8.00	2009	Davis-Bacon MT20080002 (Highway)
Truck Drivers					
Truck Driver Group 1	$18.54	$22.54	$7.86	2009	Davis-Bacon MT20080002 (Highway)
Truck Driver Group 2	$23.69	$27.69	$7.86	2009	Davis-Bacon MT20080002 (Highway)

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CDM Federal Programs Corporation

PROJECT:	Libby OU1 Final FS	COMPUTED BY :	AS	CHECKED BY:	AB
JOB NO.:	2616.015.208.FSOU1	DATE :	7/31/2009	DATE CHECKED:	7/31/2009
CLIENT:	Volpe/EPA			PAGE NO. :	LB-02

Description: Determination of base wage rates for general construction personnel (i.e., labor, equipment operators, etc.). Wage rates based on Davis-Bacon MT20080002 (Highway) Statewide, Montana Decision Number: MT20080002 06/26/2009. Fringe rates were assumed where Davis-Bacon determination did not set fringe rates.

Labor Category	Hourly	Taxable Fringe	Non-Tax Fringe[1]	Total
Electrician	$24.54	$3.48	$1.00	$29.02
Laborers				
Laborer Group 1	$21.18	$5.75	$1.00	$27.93
Laborer Group 2	$23.97	$5.75	$1.00	$30.72
Laborer Group 3	$24.17	$5.75	$1.00	$30.92
Laborer Group 4	$25.07	$5.75	$1.00	$31.82
Painter	$28.00	$7.00	$1.00	$36.00
Group 1 PEO				
A-Frame Truck Crane Operator	$25.52	$7.00	$1.00	$33.52
Auto Fine Grader Operator	$25.52	$7.00	$1.00	$33.52
Front-End Loader Operator	$25.52	$7.00	$1.00	$33.52
Pumpman Operator	$25.52	$7.00	$1.00	$33.52
Oiler	$25.52	$7.00	$1.00	$33.52
Group 2 PEO				
Backhoe/Excavator Operator	$27.55	$7.00	$1.00	$35.55
Dozer Operator	$27.55	$7.00	$1.00	$35.55
Front-End Loader Operator	$27.55	$7.00	$1.00	$35.55
Power Saw Operator	$27.55	$7.00	$1.00	$35.55
Roller Operator	$27.55	$7.00	$1.00	$35.55
Washing Plant Operator	$27.55	$7.00	$1.00	$35.55
Group 3 PEO				
Backhoe/Excavator Operator	$28.41	$7.00	$1.00	$36.41
Finish Dozer Operator	$28.41	$7.00	$1.00	$36.41
Dozer Operator	$28.41	$7.00	$1.00	$36.41
Scraper Operator	$28.41	$7.00	$1.00	$36.41
Front-End Loader Operator	$28.41	$7.00	$1.00	$36.41
Crane Operator	$28.41	$7.00	$1.00	$36.41
Asphalt Paving Machine	$28.41	$7.00	$1.00	$36.41
Concrete Paving Machine	$28.41	$7.00	$1.00	$36.41
Heavy Equipment Operator	$28.41	$7.00	$1.00	$36.41
Group 4 PEO				
Finish Scraper Operator	$29.10	$7.00	$1.00	$37.10
Crane Operator	$29.10	$7.00	$1.00	$37.10
Group 5 PEO				
Crane Operator	$30.44	$7.00	$1.00	$38.44
Group 6 PEO				
Crane Operator	$31.13	$7.00	$1.00	$39.13
Group 7 PEO				
Crane Operator	$33.23	$7.00	$1.00	$41.23
Truck Drivers				
Truck Driver Group 1	$22.54	$6.86	$1.00	$30.40
Truck Driver Group 2	$27.69	$6.86	$1.00	$35.55

Notes:

[1] Non-taxable fringe is set at $1.00 in MII per the U.S. Army Corps of Engineers, which is deducted from the total taxable fringe.

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CDM Federal Programs Corporation

PROJECT:	Libby OU1 Final FS	COMPUTED BY :	AS	CHECKED BY:	AB
JOB NO.:	2616.015.208.FSOU1	DATE :	7/31/2009	DATE CHECKED:	7/31/2009
CLIENT:	Volpe/EPA			PAGE NO. :	LB-03

Description: Determination of base wage rates for management and engineering personnel (i.e., project manager, civil engineer, etc.). Wage rates based on SalaryExpert.com, salary estimates for Libby, MT obtained on March 2009. Salary rates were used for hourly labor rate determination for the MII estimate.

Taxes, Insurance and Overhead

- Taxes, insurance, and overhead are included in the MII estimate.

Escalation

Previous salary cost index (4Q09): **724.52**

Cost estimate prep cost index (4Q09): **724.52**

Hourly Wage Calculations

Number of work hours per year: **2080** *52 weeks x 40 hours per week*

Labor Category	Base Salary	Hourly	Benefits %	Bonus %	Year	Source
Project Manager	$85,243	$40.98	15.20%	6.50%	2009	SalaryExpert.com
Const. Superintendent	$102,323	$49.19	15.20%	6.50%	2009	SalaryExpert.com
Civil Engineer	$62,439	$30.02	15.20%	6.50%	2009	SalaryExpert.com
Electrical Engineer	$64,145	$30.84	15.20%	6.50%	2009	SalaryExpert.com
Environmental Engineer	$54,477	$26.19	15.20%	6.50%	2009	SalaryExpert.com
Environmental Scientist	$52,010	$25.00	15.20%	6.50%	2009	SalaryExpert.com
Engineer QC	$61,169	$29.41	15.20%	6.50%	2009	SalaryExpert.com
Field Engineer	$55,193	$26.54	15.20%	6.50%	2009	SalaryExpert.com
Geologist	$57,891	$27.83	15.20%	6.50%	2009	SalaryExpert.com
Field Technician	$39,343	$18.91	15.20%	6.50%	2009	SalaryExpert.com
Foreman	$45,235	$21.75	15.20%	6.50%	2009	SalaryExpert.com
Drafter CAD	$44,092	$21.20	15.20%	6.50%	2009	SalaryExpert.com
Environmental Lawyer	$59,453	$28.58	15.20%	6.50%	2009	SalaryExpert.com
Paralegal	$36,617	$17.60	15.20%	6.50%	2009	SalaryExpert.com
Clerk/Typist	$39,015	$18.76	15.20%	6.50%	2009	SalaryExpert.com
Surveyor	$71,861	$34.55	15.20%	6.50%	2009	SalaryExpert.com
Surveyor Assistant	$42,383	$20.38	15.20%	6.50%	2009	SalaryExpert.com

Labor Category	Salary	Hourly	Taxable Fringe	Non-Taxable Fringe [1]	Total
Project Manager	$85,243	$40.98	$7.89	$1.00	$49.87
Const. Superintendent	$102,323	$49.19	$9.67	$1.00	$59.86
Civil Engineer	$62,439	$30.02	$5.51	$1.00	$36.53
Electrical Engineer	$64,145	$30.84	$5.69	$1.00	$37.53
Environmental Engineer	$54,477	$26.19	$4.68	$1.00	$31.87
Environmental Scientist	$52,010	$25.00	$4.43	$1.00	$30.43
Engineer QC	$61,169	$29.41	$5.38	$1.00	$35.79
Field Engineer	$55,193	$26.54	$4.76	$1.00	$32.30
Geologist	$57,891	$27.83	$5.04	$1.00	$33.87
Field Technician	$39,343	$18.91	$3.10	$1.00	$23.01
Foreman	$45,235	$21.75	$3.72	$1.00	$26.47
Drafter CAD	$44,092	$21.20	$3.60	$1.00	$25.80
Environmental Lawyer	$59,453	$28.58	$5.20	$1.00	$34.78
Paralegal	$36,617	$17.60	$2.82	$1.00	$21.42
Clerk/Typist	$39,015	$18.76	$3.07	$1.00	$22.83
Surveyor	$71,861	$34.55	$6.50	$1.00	$42.05
Surveyor Assistant	$42,383	$20.38	$3.42	$1.00	$24.80

Notes:

[1] Non-taxable fringe is set at $1.00 in MII per the U.S. Army Corps of Engineers, which is deducted from the total taxable fringe.

Table EN1. Federal and State Motor Fuels Taxes[1] (Cents per Gallon)

	Motor Gasoline	Diesel Fuel	Gasohol		Motor Gasoline	Diesel Fuel	Gasohol
Federal[2]	18.40	24.40	13.30	Mississippi[4]	18.40	18.40	18.40
Average State Tax	21.59	22.14	21.43	Missouri[4]	17.00	17.00	17.00
				Montana[4]	27.00	27.75	27.00
Alabama[4]	18.00	21.00	18.00	Nebraska	26.00	26.00	26.00
Alaska[5]	8.00	8.00	8.00	Nevada[4]	23.00	27.00	23.00
Arizona	18.00	18.00	18.00	New Hampshire	19.50	19.50	19.50
Arkansas	21.50	22.50	21.50	New Jersey[3]	10.50	13.50	10.50
California[3,4]	18.00	18.00	18.00	New Mexico	18.90	22.90	18.90
Colorado	22.00	20.50	22.00	New York[3,4]	24.45	22.65	24.45
Connecticut[3]	25.00	37.00	25.00	North Carolina	29.90	29.90	29.90
Delaware	23.00	22.00	23.00	North Dakota	23.00	23.00	23.00
District of Columbia	20.00	20.00	20.00	Ohio	28.00	28.00	28.00
Florida[4]	15.60	29.00	15.60	Oklahoma	17.00	14.00	17.00
Georgia[3,4]	7.50	7.50	7.50	Oregon[4]	24.00	24.00	24.00
Hawaii[3,4]	17.00	17.00	17.00	Pennsylvania	31.20	38.10	31.20
Idaho	25.00	25.00	22.50	Rhode Island	30.00	30.00	30.00
Illinois[3,4]	19.00	21.50	19.00	South Carolina[4]	16.00	16.00	16.00
Indiana[3]	18.00	16.00	18.00	South Dakota	22.00	22.00	20.00
Iowa[3]	21.00	22.50	19.00	Tennessee	21.00	18.00	21.00
Kansas	24.00	26.00	24.00	Texas	20.00	20.00	20.00
Kentucky	21.10	18.10	21.10	Utah	24.50	24.50	24.50
Louisiana	20.00	20.00	20.00	Vermont	20.00	26.00	20.00
Maine	28.40	29.60	28.40	Virginia[3]	17.50	16.00	17.50
Maryland	23.50	24.25	23.50	Washington[4]	37.50	37.50	37.50
Massachusetts	21.00	21.00	21.00	West Virginia	32.20	32.20	32.20
Michigan[3]	19.00	15.00	19.00	Wisconsin	32.90	32.90	32.90
Minnesota	22.00	22.00	22.00	Wyoming	14.00	14.00	14.00

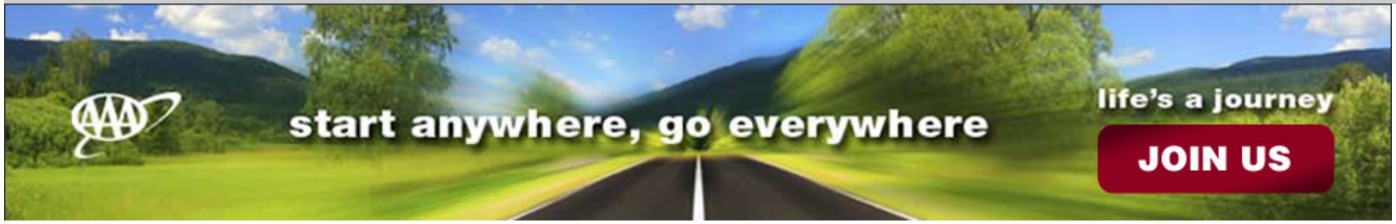
[1] This figure lists rates of general application (including, but not limited to, excise taxes, environmental taxes, special taxes, and inspection fees), exclusive of county and local taxes. Rates are also exclusive of any State taxes based on gross or net receipts. The State rates are effective July 1, 2008.

[2] The Federal tax on motor gasoline and diesel fuel increased to 18.4 and 24.4 cents, respectively, on October 1, 1997. The Federal tax on gasohol increased to 13.3 cents on January 1, 2005.

[3] Additional State taxes are levied as follows: California: 7.25 percent sales tax; Connecticut: 7.5 percent gross earnings tax; Georgia:4 percent Prepaid State Tax; Hawaii: 4 percent gross income tax; Illinois: 6.25 percent sales tax (suspended for the period beginning July 1, 2000, and ending December 31, 2000); Indiana: 6 percent sales tax (suspended for the period between July 1, 2000 and September 15, 2000); Iowa: 1.0 cent per gallon Environmental Protection Charge; Michigan: 6 percent sales tax; New Jersey: gross receipts tax of 4 cents per gallon for on-highway use fuels; New York: 8.0 cents per gallon State sales tax in addition to Local sales taxes; Virginia: 2 percent sales tax in areas where mass transit systems exist.

[4] Local option taxes (LOTS) are allowed. In Florida, the State assesses a State Comprehensive Enhanced Transportation System (SCETS) tax on gasoline which is two-thirds of each county's rate. In addition, the State collects a "ninth cent tax" and a second local tax. These taxes add an average of 14.5 cents to the gasoline State tax. In Hawaii, LOTS are as follows: Honolulu: 16.5 cents per gallon; Maui: 16.0 cents per gallon; Hawaii: 8.8 cents per gallon; Kauai: 13.0 cents per gallon. In Nevada, additional county taxes on gasoline range from 5 to 10 cents per gallon.

[5] The State of Alaska suspended its motor fuels taxes on all fuel types and uses for a period of one year beginning September 1, 2008 and ending August 31, 2009.



AAA's Daily Fuel Gauge Report *The most comprehensive nationwide fuel price survey available from any source.*

AAA | OPIS | Method | FAQs | Commentary | State Prices | AAA Maps | Links | En Español

Select A Market

Prices updated as of 7/31/2009 2:58:32 AM

Data provided by Oil Price Information Service *in cooperation with* Wright Express
Media are encouraged to localize fuel price stories by contacting their local AAA club media representative.

Montana Average Prices

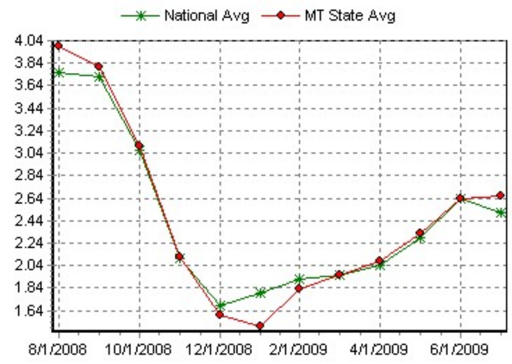
	Regular	Mid	Premium	Diesel
Current Avg.	$2.624	$2.736	$2.868	$2.521
Yesterday Avg.	$2.624	$2.736	$2.868	$2.520
Week Ago Avg.	$2.625	$2.738	$2.870	$2.548
Month Ago Avg.	$2.712	$2.828	$2.964	$2.614
Year Ago Avg.	$4.116	$4.275	$4.392	$4.637

View Montana Metro Areas

Highest Recorded Average Price:

Regular Unl.	$4.207	7/19/2008
DSL.	$4.671	7/22/2008

12 Month Average For Regular



For information on automotive fuel issues, including AAA's recommendations regarding fuel conservation, click here.

AAA's Daily Fuel Gauge Report is updated daily and is the most comprehensive retail gasoline survey available. Every day over 100,000 self-serve stations are surveyed.

TreasuryDirect®

Prompt Payment Act Interest Rate

Renegotiation Board Interest Rate; **Prompt Payment Act Interest Rate**; **Contract Dispute Act Interest Rate**

Although the Renegotiation Board is no longer in existence, other federal agencies are required to use interest rates computed under the criteria established by the Renegotiation Act of 1971 (P.L. 92-41). For example, the Contract Dispute Act of 1978 (P.L. 95-563) and the Prompt Payment Act (P.L. 97-177) provide for interest due on claims at a rate established by the Secretary of the Treasury pursuant to 31 U.S.C. § 3902(a).

For the period beginning July 1, 2009 and ending December 31, 2009, the rate of interest applicable for the purpose of the cited sections is 4.875% (4.875 per centum) per annum. The rate of interest was published in the Federal Register Volume 74, Number 126, page 31794 on Thursday, July 2, 2009.

(Updated July 1, 2009)

Previous Rates

Period	Rate	Federal Register
Jan 09 - Jun 09	5-5/8%	Vol. 73 #250, 12/30/08, pages 79977-79978
Jul 08 - Dec 08	5-1/8%	Vol. 73 #127, 07/01/08, page 37529
Jan 08 - Jun 08	4-3/4%	Vol. 72 #249, Monday, 12/31/07, page 74408
Jul 07 - Dec 07	5-3/4%	Vol. 72 #125, Friday, 06/29/07, pages 35742-35743
Jan 07 - Jun 07	5-1/4%	Vol. 71 #250, Friday, 12/29/06, pages 78513-78514
Jul 06 - Dec 06	5-3/4%	Vol. 71 #126, Friday, 06/30/06, pages 37638-37639
Jan 06 - Jun 06	5-1/8%	Vol. 70 #247, Tuesday, 12/27/05, page 76497
Jul 05 - Dec 05	4-1/2%	Vol. 70 #126, Friday, 07/01/05, page 38253
Jan 05 - Jun 05	4-1/4%	Vol. 69 #250, Thursday, 12/30/04, pages 78522-78523
Jul 04 - Dec 04	4-1/2%	Vol. 69 #124, Tuesday, 06/29/04, pages 38952-38953
Jan 04 - Jun 04	4%	Vol. 68 #249, Tuesday, 12/30/03, page 75317
Jul 03 - Dec 03	3-1/8%	Vol. 68 #126, Tuesday, 07/01/03, page 39185
Jan 03 - Jun 03	4-1/4%	Vol. 67 #247, Tuesday, 12/24/02, page 78566
Jul 02 - Dec 02	5-1/4%	Vol. 67 #126, Monday, 07/01/02, page 44264
Jan 02 - Jun 02	5-1/2%	Vol. 66 #249, Friday, 12/28/01, page 67366
Jul 01 - Dec 01	5-7/8%	Vol. 66 #127, Monday, 07/02/01, page 34990
Jan 01 - Jun 01	6-3/8%	Vol. 65 #250, Thursday, 12/28/00, page 82457
Jul 00 - Dec 00	7-1/4%	Vol. 65 #127, Friday, 06/30/00, page 40727
Jan 00 - Jun 00	6-3/4%	Vol. 64 #245, Wednesday, 12/22/99, page 71851
Jul 99 - Dec 99	6-1/2%	Vol. 64 #127, Friday, 07/02/99, page 36068
Jan 99 - Jun 99	5%	Vol. 63 #251, Thursday, 12/31/98, page 72346
Jul 98 - Dec 98	6%	Vol. 63 #125, Tuesday, 6/30/98, page 35645
Jan 98 - Jun 98	6-1/4%	Vol. 62 #250, Wednesday, 12/31/97, page 68356
Jul 97 - Dec 97	6-3/4%	Vol. 62 #126, Tuesday, 7/01/97, page 35541
Jan 97 - Jun 97	6-3/8%	Vol. 62 # 4, Tuesday, 1/07/97, page 1023
Jul 96 - Dec 96	7%	Vol. 61 #140, Friday, 7/19/96, page 37794
Jan 96 - Jun 96	5-7/8%	Vol. 61 # 7, Wednesday, 1/10/96, page 763
Jul 95 - Dec 95	6-3/8%	Vol. 60 #128, Wednesday, 7/05/95, page 35105

Jan 95 - Jun 95	8-1/8%	Vol. 60 # 2, Wednesday, 1/04/95, page 530
Jul 94 - Dec 94	7%	Vol. 59 # 127, Tuesday, 7/05/94, page 34464
Jan 94 - Jun 94	5-1/2%	Vol. 59 # 19, Friday, 1/28/94, page 4135
Jul 93 - Dec 93	5-5/8%	Vol. 58 # 128, Wednesday, 7/07/93, page 36511
Jan 93 - Jun 93	6-1/2%	Vol. 57 # 251, Wednesday, 12/30/92, page 62418
Jul 92 - Dec 92	7%	Vol. 57 # 128, Thursday, 7/02/92, page 29559
Jan 92 - Jun 92	6-7/8%	Vol. 57 # 3, Monday, 1/06/92, page 428
Jul 91 - Dec 91	8-1/2%	Vol. 56 # 127, Tuesday, 7/02/91, page 30413
Jan 91 - Jun 91	8-3/8%	Vol. 56 # 1, Wednesday, 1/02/91, page 101
Jul 90 - Dec 90	9%	Vol. 55 # 129, Thursday, 7/05/90, page 27743
Jan 90 - Jun 90	8-1/2%	Vol. 54 # 249, Friday, 12/29/89, page 53798
Jul 89 - Dec 89	9-1/8%	Vol. 54 # 123, Wednesday, 6/28/89, page 27266
Jan 89 - Jun 89	9-3/4%	Vol. 53 # 251, Friday, 12/30/88, page 53117
Jul 88 - Dec 88	9-1/4%	Vol. 53 # 126, Thursday, 6/30/88, page 24827
Jan 88 - Jun 88	9-3/8%	Vol. 52 # 250, Wednesday, 12/30/87, page 49246
Jul 87 - Dec 87	8-7/8%	Vol. 52 # 126, Wednesday, 7/01/87, page 24581
Jan 87 - Jun 87	7-5/8%	Vol. 52 # 4, Wednesday, 1/07/87, page 655
Jul 86 - Dec 86	8-1/2%	Vol. 51 # 129, Monday, 7/07/86, page 24603
Jan 86 - Jun 86	9-3/4%	Vol. 51 # 8, Monday, 1/13/86, page 1469
Jul 85 - Dec 85	10-3/8%	Vol. 50 # 128, Wednesday, 7/03/85, page 27525
Jan 85 - Jun 85	12-1/8%	Vol. 49 # 250, Thursday, 12/27/84, page 50357
Jul 84 - Dec 84	14-3/8%	Vol. 49 # 125, Wednesday, 6/27/84, page 26335
Jan 84 - Jun 84	12-3/8%	Vol. 48 # 249, Tuesday, 12/27/83, page 57044
Jul 83 - Dec 83	11-1/2%	Vol. 48 # 126, Wednesday, 6/29/83, page 29985
Jan 83 - Jun 83	11-1/4%	Vol. 47 # 247, Thursday, 12/23/82, page 57388
Jul 82 - Dec 82	15-1/2%	Vol. 47 # 123, Friday, 6/25/82, page 27654
Jan 82 - Jun 82	14-3/4%	Vol. 47 # 2, Tuesday, 1/05/82, page 366
Jul 81 - Dec 81	14-7/8%	Vol. 46 # 124, Monday, 6/29/81, page 33413
Jan 81 - Jun 81	14-5/8%	Vol. 46 # 2, Monday, 1/05/81, page 1073
Jul 80 - Dec 80	10-1/2%	Vol. 45 # 126, Friday, 6/27/80, page 43515
Jan 80 - Jun 80	12-1/4%	Vol. 45 # 8, Friday, 1/11/80, page 2456

Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State

Electric Power Monthly with data for April 2009
Report Released: July 10, 2009
Next Release Date: Mid-August 2009

Table 5.6.A. xls format Electric Power Monthly

Table 5.6.A. Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, April 2009 and 2008
(Cents per kilowatthour)

Census Division and State	Residential		Commercial[1]		Industrial[1]		Transportation[1]		All Sectors	
	Apr-09	Apr-08	Apr-09	Apr-08	Apr-09	Apr-08	Apr-09	Apr-08	Apr-09	Apr-08
New England	**17.86**	**16.9**	**16.2**	**14.67**	**10.98**	**12.62**	**8.34**	**10.96**	**15.53**	**15.03**
Connecticut	20.43	19.42	15.5	15.64	13.99	13.53	12.93	12.94	17.14	16.65
Maine	15.23	16.34	12.09	12.28	9.66	11.63	--	--	12.58	13.54
Massachusetts	17.74	16.27	19.18	15.02	10.06	13.22	5.5	9.92	15.71	15.07
New Hampshire	16.9	15.23	15.77	13.56	14.77	12.38	--	--	16.05	13.97
Rhode Island	15.31	15.06	12.56	13.35	12.69	12.3	--	--	13.53	13.73
Vermont	15.21	14.77	12.87	12.61	9.25	8.66	--	--	12.81	12.24
Middle Atlantic	**14.68**	**14.58**	**12.82**	**13.45**	**8.44**	**8.46**	**13.45**	**11.69**	**12.65**	**12.74**
New Jersey	15.89	14.05	14.09	13.66	10.9	10.76	NM	15.38	14.44	13.4
New York	17.45	18.62	14.24	15.9	9.91	11.96	14.68	12.44	14.85	16.27
Pennsylvania	11.61	11.17	9.6	9.35	7.59	6.97	7.75	7.88	9.68	9.13
East North Central	**11.13**	**10.42**	**8.86**	**8.81**	**6.64**	**6.3**	**9.28**	**7.24**	**8.83**	**8.36**
Illinois	11.89	11.09	8.26	8.46	7.45	7.6	8.89	6.82	9.19	9.01
Indiana	9.86	9.25	8.23	7.72	5.84	5.4	10.1	9.69	7.59	6.96
Michigan	10.98	10.4	8.88	9.3	6.81	6.87	10.7	13.75	8.93	8.83
Ohio	10.99	10.08	9.85	9.24	6.85	6.07	12.26	10.26	9.1	8.18
Wisconsin	11.91	11.59	9.4	9.32	6.6	6.47	--	--	9.19	8.87
West North Central	**8.96**	**8.46**	**7.08**	**6.68**	**5.57**	**5.03**	**6.37**	**6.22**	**7.28**	**6.72**
Iowa	10.29	9.76	7.29	7.03	4.97	4.57	--	--	7.13	6.61
Kansas	9.69	8.91	8.02	7.31	6.42	5.49	--	--	8.12	7.23
Minnesota	10.01	9.34	7.7	7.21	6.16	5.49	7.77	7.93	7.94	7.21
Missouri	8.15	7.72	6.23	5.99	4.98	4.57	4.97	4.54	6.73	6.32
Nebraska	7.98	7.4	7.04	6.31	5.6	4.93	--	--	6.88	6.2
North Dakota	7.34	7.34	6.55	6.7	5.61	5.51	--	--	6.56	6.53
South Dakota	8.18	7.95	6.7	6.66	5.62	5.17	--	--	7.12	6.87
South Atlantic	**11.35**	**10.4**	**9.63**	**8.97**	**6.65**	**5.89**	**10.58**	**10.31**	**9.77**	**8.86**
Delaware	14.2	13.87	11.95	11.66	9.27	9.77	--	--	12.2	11.89
District of Columbia	12.73	11.11	14.3	14.48	8.37	11.04	12.59	12.07	13.89	13.83
Florida	12.33	11.29	10.93	9.87	9.37	7.9	10.73	9.75	11.46	10.35
Georgia	9.85	9.5	8.74	8.85	5.9	6.12	6.39	6.54	8.46	8.3
Maryland	14.82	13.34	11.79	11.88	10.35	10.14	11.44	11.91	12.87	12.29
North Carolina	10.31	9.68	7.86	7.41	5.84	5.28	6.76	6.54	8.42	7.76
South Carolina	10.51	9.85	8.39	8.12	5.69	4.99	--	--	8.09	7.3
Virginia	10.73	8.97	8.28	6.58	6.92	5.26	8.74	7.11	8.95	7.21
West Virginia	7.97	7.06	6.74	6.05	5.4	4.05	8.56	5.92	6.67	5.42
East South Central	**9.73**	**8.99**	**9.19**	**8.49**	**5.77**	**5.16**	**12.5**	**9.47**	**7.96**	**7.16**
Alabama	10.88	9.79	9.89	8.84	6.04	5.22	--	--	8.71	7.47
Kentucky	8.52	7.82	7.57	6.97	4.82	4.46	--	--	6.31	5.78

Mississippi	10.4	9.91	9.55	9.33	6.82	6.05	--	--	8.9	8.25
Tennessee	9.45	8.8	9.55	8.86	6.63	5.69	12.5	9.47	8.59	7.7
West South Central	**11.58**	**11.39**	**9.11**	**9.81**	**6.79**	**7.95**	**9.9**	**8.81**	**9.18**	**9.66**
Arkansas	9.43	9.57	7.52	7.57	5.69	5.71	--	--	7.57	7.43
Louisiana	8.73	9.88	8.31	9.8	5.9	7.61	9.97	11.95	7.57	8.96
Oklahoma	8.82	9.01	6.58	7.12	4.99	5.35	--	--	6.94	7.17
Texas	13.02	12.37	9.82	10.48	7.43	8.83	9.89	8.59	10.1	10.54
Mountain	**9.78**	**9.54**	**8.23**	**8.22**	**5.72**	**5.87**	**7.73**	**8.28**	**7.93**	**7.85**
Arizona	10.65	10.02	8.93	8.5	6.13	6.24	--	--	9.02	8.59
Colorado	9.57	10.14	7.87	8.95	5.99	6.53	7.46	8.45	7.96	8.67
Idaho	7.28	6.67	6.27	5.45	4.8	3.91	--	--	6.17	5.37
Montana	8.65	8.92	8.14	8.47	5.15	6.09	--	--	7.08	7.46
Nevada	12.97	12.52	10.52	10.33	7.2	7.78	8.89	8.83	9.7	9.73
New Mexico	9.65	9.49	8.04	8.19	5.72	5.75	--	--	7.74	7.69
Utah	8.17	7.93	6.7	6.4	4.76	4.54	7.8	7.88	6.58	6.27
Wyoming	8.34	7.95	7.26	6.7	4.63	4.27	--	--	5.93	5.54
Pacific Contiguous	**11.56**	**11.06**	**11.1**	**10.59**	**7.53**	**6.93**	**7.56**	**7.9**	**10.5**	**9.93**
California	14.21	13.51	12.46	11.84	9.36	8.33	7.58	7.92	12.41	11.64
Oregon	8.65	8.61	8.27	8.21	4.65	4.29	6.78	7.04	7.54	7.37
Washington	7.71	7.49	7.07	6.74	5.1	5.41	6.02	5.59	6.86	6.71
Pacific Noncontiguous	**20.01**	**24.98**	**17.09**	**21.3**	**14.81**	**21.31**	**--**	**--**	**17.32**	**22.44**
Alaska	16.95	17.21	14.42	13.66	12.08	14.54	--	--	14.76	15.04
Hawaii	22.19	30.31	19.44	27.45	15.85	23.81	--	--	18.97	26.96
U.S. Total	**11.59**	**11.02**	**9.99**	**9.86**	**6.78**	**6.64**	**11.36**	**10.49**	**9.69**	**9.3**

[1] See Technical notes for additional information on the Commercial, Industrial, and Transportation sectors.

Notes: See Glossary for definitions. Values for 2007 are final. Values for 2008 are preliminary estimates based on a cutoff model sample. See Technical Notes for a discussion of the sample design for the Form EIA-826. Utilities and energy service providers may classify commercial and industrial customers based on either NAICS codes or demands or usage falling within specified limits by rate schedule. Changes from year to year in consumer counts, sales and revenues, particularly involving the commercial and industrial consumer sectors, may result from respondent implementation of changes in the definitions of consumers, and reclassifications. Retail sales and net generation may not correspond exactly for a particular month for a variety of reasons (i.e., sales data may include imported electricity). Net generation is for the calendar month while retail sales and associated revenue accumulate from bills collected for periods of time (28 to 35 days) that vary dependent upon customer class and consumption occurring in and outside the calendar month. Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Form EIA-826, "Monthly Electric Sales and Revenue Report with State Distributions Report."

More Tables on the Average Retail Price of Electricity	**Formats**		
Table ES. Summary Statistics for the United States	html	pdf	xls
Table 5.3. Average Retail Price of Electricity to Ultimate Customers: Total by End-Use Sector	html		xls
Table 5.6.B. Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, Year-to-Date	html		xls
Table ES1.A. Total Electric Power Industry Summary Statistics,	html		xls
Table ES1.B. Total Electric Power Industry Summary Statistics,Year-to-Date	html		xls
Average Price by State by Provider (EIA-861)			xls
Current and Historical Monthly Retail Sales, Revenues and Average Revenue per Kilowatthour by State and by Sector (Form EIA-826)			xls
Form EIA-861 Database			DBF
Table 7.4. Average Retail Price of Electricity to Ultimate Customers by End-Use Sector	html	pdf	xls
"Electric Sales, Revenue and Average Price"	html		

see also:
Electric Power Monthly
Electric Power Annual

Checkout

Checkout Help

Required Date: 03/19/09

6 Items on Order

Qty	Unit of Measure	Item Description	Unit Price	Ext Price
1	rl (1)	YELLOW CAUTION BARRICADE TAPE, 3" X 1000', 2 MIL, BT-05AL	14.45 rl	14.45
1	rl (1)	RED DANGER ASBESTOS HAZARD BARRICADE TAPE, 3" X 1000', 2 MIL, BT-48AL	14.45 rl	14.45
1	ea (1)	CORTINA 97-01-004 A FRAME LEG (BARRICADE) WHITE	25.00 ea	25.00
2	ea (1)	CORTINA 03-10-3WAY6V BARRICADE LIGHT	22.50 ea	45.00
1	rl (1)	ORANGE 4' X 100' BARRIER FENCE WITH 2" X 4" OPENINGS	30.21 rl	30.21
5	ea (1)	6' METAL FENCE POST	10.50 ea	52.50

Subtotal	181.61
Estimated Freight	18.71
Total	200.32

** Total does not include taxes (if applicable) **

Comments

UPDATE | STANDARD CHECKOUT >

- To modify quantities, click Update.To remove a product from your cart, enter 0 in the Quantity Field, then click Update
- To check out, click on "Standard Checkout." You will be asked for additional information before your order is submitted.

Quote Details

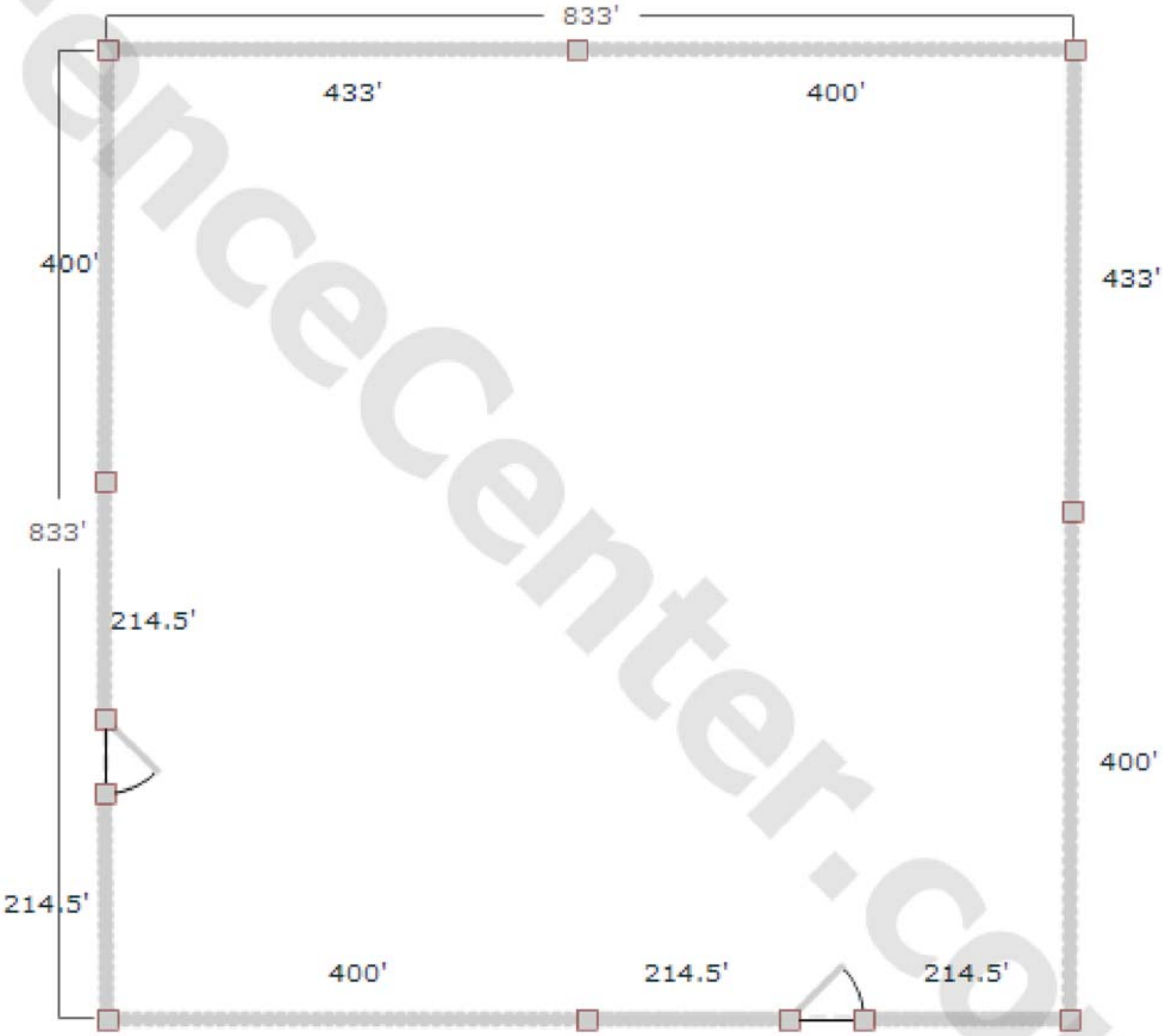
Quote ID: 60213D

Date: 8/19/2009 3:27 PM

Style Details
Name: Galvanized Chain Link 96" High +BW
Height: 8'
Color:

Abhay Sonawane

Libby, MT 59923



Quote Details

Quote ID: 60213D

Date: 8/19/2009 3:27 PM

Style Details
Name: Galvanized Chain Link 96" High +BW
Height: 8'
Color:

Abhay Sonawane

Libby, MT 59923

Materials List

Name	SKU	Price	Quantity	Total
Galvanized, Satin Smooth - 2 Inch Mesh, 9 Gauge - 96 Inch KB	SS63096	$253.70	67	$16,997.89
Pipe - Galvanized Pipe - Heavyweight - 3 Inch Diameter, SS40 - 12 Ft.	GP30040120	$98.84	12	$1,186.08
Pipe - Galvanized Pipe - Middleweight - 2 1/2 Inch Diameter, SS20 - 10 Ft. 6 In.	GP25020106	$40.42	326	$13,176.92
Galvanized - Industrial, Single Gate - 1 58 Inch x 3 12 Ft. x 8 Ft.	GSB4296	$171.14	2	$342.28
Pipe - Galvanized Pipe - Middleweight - 1 5/8 Inch Diameter, SS15 - 21 Ft. Swedge	GP15815210S	$40.32	159	$6,410.88
Commercial Barb Wire - Class 3 - 1320 ft.	BW003	$116.77	8	$934.16
Aluminum Hook Tie - 9 Gauge x 8 14 Inch #16	AT16	$7.41	34	$251.94
Commercial Galvanized Post Cap - 3 Inch Steel Dome	SDC300	$2.29	12	$27.48
Commercial Galvanized Brace Band 3 Inch Beveled	BBB300	$0.86	80	$68.80
Commercial Galvanized Tension Band 3 Inch Beveled	TBB300	$0.86	140	$120.39
Commercial Steel Brace Rail End - 1 5/8 Inch	SBRE158	$1.21	20	$24.20
Commercial Tension Bar 3/4 Inch x 96 Inch	TR34096	$4.62	20	$92.40
Carriage Nut & Bolt 5/16 Inch x 1 1/4 Inch	CB16125	$0.10	240	$24.00
Commercial Industrial Offset Hinge 3 Inch	IOH300	$15.53	4	$62.12

Quote Details

Quote ID: 60213D

Date: 8/19/2009 3:27 PM

Style Details
Name: Galvanized Chain Link 96" High +BW
Height: 8'
Color:

Abhay Sonawane

Libby, MT 59923

Materials List

Name	SKU	Price	Quantity	Total
Commercial Collar 1 5/8 Inch	CL158	$1.51	2	**$3.02**

Quote Details

Quote ID: 60213D

Date: 8/19/2009 3:27 PM

Style Details
Name: Galvanized Chain Link 96" High +BW
Height: 8'
Color:

Abhay Sonawane

Libby, MT 59923

Order Online

Sub Total:	$39,722.58
Tax:	$1,720.00
Shipping:	$1,900.00

Your Quote: This is a complete material list for a standard installation for this project; based on your drawing. If you have special applications or situations for our project, you can call us direct to get an updated price. Some styles of fence offer a variety of gate openings and accessories that can be found in the catalog. Fence Center can not be responsible for errors that may have been made during quoting process and would be glad to double check your material list before shipment.

Shipping Cost: Because of fluctuating fuel prices, shipping cost could change from the time of quote to the time of order, if you place your order 30 days after the quote, please contact us to see if there may have been an increase.

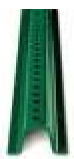
To order by fax: Send your quote and material list to 240-487-2489 along with your contact information and we will call to confirm the order and get payment information.

To order phone: Call us at 888-336-2358 Monday thru Friday between the hours of 8:00am and 5:00pm EST.

Search entire store here... Search

Shopping Cart

Proceed to Checkout

Remove		Product Name	Unit Price	Qty	Subtotal
		Danger Asbestos - Sign	$29.25	11	$321.75
		U-Channel Post 6'	$29.75	11	$327.25
		TUFNUT Sign Set (2 units)	$6.50	11	$71.50

Continue Shopping

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ESTIMATE SHIPPING AND TAX

Enter your destination to get a shipping estimate.

Country *

United States

State/Province

Montana

Zip/Postal Code *

59923

Get a Quote

UPS

- (•) Ground $131.49
- ( ) 3 Day Select $306.60
- ( ) 2nd Day Air $475.80
- ( ) Next Day Air $648.45

Pickup

- ( ) I will pick up my order $0.00

Update Total

Subtotal	$720.50
Shipping & Handling (UPS - Ground)	$131.49
Grand Total	**$851.99**

Proceed to Checkout